ILRI

INTERNATIONAL
LIVESTOCK RESEARCH
INSTITUTE

ILRI Medium-Term Plan 2005–2007

Livestock: a pathway out of poverty

Vision

A world made better for poor people in developing countries by improving agricultural systems in which livestock are important.

Mission

ILRI works at the crossroads of livestock and poverty, bringing high quality science and capacity building to bear on poverty reduction and sustainable development for poor livestock keepers and their communities.

Mandate

To measurably and sustainably improve the livelihoods of resource-poor livestock keepers, make animal products more affordable and accessible for the poor and conserve natural resources in developing countries through partnerships and alliances for innovative livestock research, training and information exchange.

Foreword

Over the last few years ILRI has realigned itself to meet the challenge of addressing poverty through livestock-related research. When we defined our strategy in 2002, we made a deliberate effort to focus on research outputs that would lead to outcomes having a significant impact on poverty alleviation. We identified three pathways out of poverty in which livestock, one of the central assets of the poor, play an important role. Based on this analysis, we regrouped our research efforts within five themes (Projects) based on their poverty-alleviating strategy.

In 2003, we began implementing the new strategy by assembling a new management team with the vision and range of skills appropriate to ILRI's renewed outlook. We also started realigning our existing operating projects and designing new projects that were coherent with theme purposes and more carefully targeted at poverty alleviation. Subsequent developments in this process are presented in this Medium Term Plan.

At ILRI, we recognize that livestock systems are complex and that we cannot provide a single 'magic bullet' answer to the complex problem of poverty alleviation. We also recognize that we cannot achieve our desired impacts without partnerships. We are therefore constantly appraising our competencies against what is needed to effectively tackle the issues and those of potential partners to identify those areas where the complementary skills can be used to the best advantage. We then create partnerships that we believe will deliver technology and policy options that will make a positive impact on the needs of poor people.

As we move in this new and exciting research direction, we are aware of the importance of maintaining and improving the quality of the science we conduct. We are therefore in the process of establishing an independent Science Advisory Panel, made up of eminent researchers, to provide a regular external input into the assessment of the quality of the research that we are undertaking.

The 2005-2007 Medium Term Plan outlines ILRI's work in this new strategic direction over the next three years. Our focus is on impacts, which we aim to achieve together with our strategic partners.

We also present the Medium Term Plan of the Systemwide Livestock Programme (SLP), which involves 11 centres of the Consultative Group on International Agricultural Research (CGIAR) and their partners and is convened by ILRI. The SLP was established to support the CGIAR's global livestock research agenda. Its current focus is on livestock feed resources in mixed crop-livestock systems in which crop breeding, seed systems, and livestock production expertise from different centres are brought together within a broader integrated natural resource management and policy context.

We look forward to becoming more effective in achieving ILRI's primary goal – producing and making available knowledge and products that will make a positive difference in the lives of the poor.

Carlos Seré
Director General

Overview

ILRI's stated mandate is to reduce poverty and make sustainable development possible through livestock-related research. ILRI is determined to ensure that its research effectively contributes towards meeting the Millennium Development Goals (MDG) for poverty alleviation. Along with our other research and development partners, ILRI is keenly aware of the need to enhance the relevance and impact of its research in a rapidly changing global context.

ILRI's strategy is grounded on two premises: the Livestock Revolution and the multiple roles of livestock in the livelihood strategies of poor people. The Livestock Revolution encapsulates the fact that as developing country societies become more urban and experience economic growth, their food consumption patterns increasingly shift to high-value and processed foods such as animal products, oils and vegetables. This demand growth creates a unique opportunity for the growth of the livestock sector. ILRI's goal is to maximize the value of this development opportunity as a tool to reduce poverty by enhancing the participation of poor people in dynamic livestock value chains, thereby providing them with increased incomes. While global change and market forces present many opportunities, they also pose threats for poor livestock producers. Increasing length of food chains, growing concerns about food safety and economies of scale in intensive production systems are threatening the participation of poor livestock keepers in these increasingly complex markets. Public research on technologies, institutions and policies can create more pro-poor options. Vertical coordination of smallholder livestock keepers, for example, may allow small-scale producers to remain in high-value market chains, but it also raises issues of empowerment for the poor that research on pro-poor cases can learn from to improve results elsewhere.

Structural change related to rapidly growing demand for livestock products is leading to the development of large-scale production units, which can better address food safety concerns of urban markets. If developed with the appropriate policies to eliminate negative food safety impacts, these developments can have pro-poor impacts under certain conditions, particularly when related to employment of poor people in activities along the value chain. The magnitude of these poverty alleviation impacts is dependent on the forward and backward linkages of such livestock enterprises, as well as the propensity of those employed in these enterprises to spend their new livestock incomes on consumer items and services typically produced by the very poor.

The opportunities for using livestock as a tool for poverty reduction particularly hinge on rapid growth in demand for livestock products. In many parts of the developing world, poor livestock keepers do not have these opportunities. Nevertheless livestock frequently are a key component of poor peoples' livelihood strategies, with livestock assets providing services such as transport, traction for land preparation and a source of manure for soils depleted of organic material. ILRI's strategy recognizes that quite distinct tools are required to reduce poverty under such circumstances. Careful analysis is required to understand the constraints and opportunities under these conditions. Frequently, very marginal environments put a ceiling on potential productivity increases. Here, public livestock research and development can reduce vulnerability in a number of ways, such as provision of vaccines, insurance schemes against natural disasters and early warning systems. In many settings livestock will be only one of several diverse strategies needed to escape poverty.

In better-endowed regions with poor access to markets, mixed farming systems are predominant. Productivity increases, for example, through better utilization of crop residues in ruminant production,

introduction of fodder species and adapted livestock genotypes are potential entry points. The success of such productivity-increasing interventions is generally linked to reducing market constraints.

Livestock play an increasing role in peri–urban systems. These systems are driven by growth of urban demand and inefficiency of market chains linking more remote producers to these markets. These systems frequently also provide income opportunities for landless poor, who provide fodder, collect waste to feed to animals and engage in distribution and marketing of outputs of such informal systems. The externalities associated with these systems, however, present formidable public health issues and environmental challenges.

ILRI research recognizes the importance of animal products for poor consumers, for whom targeted research that raises productivity, improves food safety and lowers marketing costs in the sectors serving poor consumers can increase their access to lower cost and more reliable supplies of safe animal-source foods. In many cases these consumers spend a significant share of their disposable income on animal products, which provide an important source of minerals and micronutrients to their diets. Access to small amounts of these nutrients has been shown to benefit the physical and cognitive development of children, as well as mitigating the effects of diseases such as HIV/AIDS.

Given the above context for livestock as a tool to address poverty, ILRI has adopted a "pathways out of poverty" framework, based on the sustainable livelihoods approach. In this approach, it is recognized that poor households face a range of external threats that influence their livelihoods. The challenge for these households is to manage their limited asset base through a set of livelihood strategies conditioned by processes and structures, both internal to the households and in the external environment, to generate desired outcomes that usually include higher income and reduced vulnerability. The three pathways through which ILRI seeks to improve the contribution of livestock in poor households are:

- securing the assets of the poor
- improving the productivity of their livestock systems
- improving their market opportunities

Through these pathways, ILRI seeks to take advantage of the potentials for livestock and livestock-related research to ensure uptake of improved technologies, policies and institutions that will contribute to improving the well-being of the poor.

The work is organized in five interdisciplinary issue-oriented themes (referred to as Projects in the CGIAR Medium Term Plan terminology)[1]:

- Targeting Research and Development Opportunities
- Enabling Innovation
- Improving Market Opportunities
- Biotechnology
- People, Livestock and the Environment.

ILRI has undergone significant change in the way it conducts its research to ensure maximum impact on poverty. Some salient aspects of this change in approach include:

- An explicit strategy to address poverty as the key MDG to which ILRI can contribute
- A new theme on innovation systems research to ensure full stakeholder

[1] In this MTP the following hierarchy of "projects" is adopted; Project (with a capital P) is one of the 5 ILRI research Themes (the Systemwide Livestock Programme is presented as ILRI Project 6); an operating project is a group of related research activities within a Theme leading to common outputs in a defined time frame – Projects have 3-5 operating projects; within operating projects, a project (with a small p) is a defined donor-funded or partner-based research activity.

involvement in the development of research activities with high likelihood of leading to rapid uptake of innovations.
- Focus on markets and market access as a key driver influencing the potential of livestock to contribute to poverty reduction and economic growth.

To achieve our goals, ILRI has developed a range of innovative institutional partnership arrangements. These partnerships are demand-driven and outcome-oriented and involve linking with advanced research institutes (ARIs), Non-Governmental Organisations (NGOs), farmer groups, the private sector, national agricultural research and extension systems, universities and other CGIAR centres. They are guided by a set of institutional principles that ILRI has developed. Some examples that highlight this innovative way of doing business differently include:

- Establishment of a joint program with IFPRI to merge insights from broad economic policy thinking with specialized knowledge of livestock science and to achieve synergies through better inclusion of ILRI's livestock work into a broader CGIAR emphasis on improving smallholder livelihoods through diversification into high-value agriculture more generally.
- Emphasis on application of advanced biosciences to "orphan" problems, expanding the scope of the work by establishing with others a shared biosciences facility for eastern and central Africa. This will enlarge the capacity of African partners to address their biosciences research needs and will allow ILRI to share its expertise more widely than in the past.
- Establishment of a range of strategic partnerships to address the challenges. This includes partnerships with other CGIAR centres on the Addis Ababa campus to provide a platform for integrated natural resource management (INRM), innovation systems and capacity building. Centres involved presently include CIAT, ICRAF, IFPRI (including its ISNAR program), IWMI, CIMMYT, and ICIPE. Similar partnerships in other parts of the world include ICRISAT and IITA, among others.
- A special relationship with the Animal Production and Health (AGA) division of the Food and Agriculture Organization of the United Nations (FAO).
- A private-public partnership involving a large pharmaceutical company and several advanced research institutes to develop a new East Coast fever vaccine.
- An innovative partnership with an NGO (Veterinaires sans Frontieres-Belgium) to explore options for the delivery of animal health services.
- The inclusion of individual and institutional capacity strengthening as an integral part of all ILRI's research activities.
- The establishment of a joint laboratory for animal and forage genetic resources characterization with the Chinese Academy of Agricultural Sciences, Beijing.

ILRI's comparative advantage

ILRI sees its comparative advantage evolving as an institution engaged in livestock knowledge discovery and management for poverty alleviation and sustainable development in developing countries. Many other institutions are also addressing these issues; they include national agricultural research systems (NARS) and sub-regional organizations (SROs), research and analysis units within government departments, ARIs and universities, NGOs and private firms and consultants. ILRI is developing productive partnerships with all of these types of institutions. Yet ILRI is at the crossroads of

livestock research and social objectives such as poverty alleviation in a way that is rarely seen elsewhere.

As a CGIAR centre, ILRI has a comparative advantage in focusing on those issues of widespread and critical relevance where insights can be transferred and synergies achieved across countries, regions and different kinds of organizations. While ARIs, universities, NGOs and private consultants may also be engaged in the production of international public goods, the reality of their modes of operation and funding rarely permits maintaining scientific commitment on an institutional basis to solve specific long-term problems in developing countries, and then ensuring uptake of discoveries. Furthermore, few institutions in developing countries are as well-placed to achieve effective long-term coordination between the rigorous hypothesis-testing of hard livestock-related science and the pragmatic experimentation of action-research in the field.

ILRI achieves its comparative advantage through a form of organization and governance that overcomes many of the constraints imposed on other types of institutions in the livestock knowledge discovery and management area. With offices in East and West Africa, South and Southeast Asia, China and Central America, and projects in Southern Africa, North Africa and the Near East, ILRI has a truly global footprint. Yet its internal form of organization is not regional but thematic. ILRI's agenda and way of operating is heavily influenced through long-term host country, regional and global agreements with NARS and SROs, and with specialized livestock-relevant institutions in the development sphere such as the World Animal Health Organization (OIE) and the Animal Health and Production Division of FAO. It also partners to a great extent with sister CGIAR centres, both directly and through the System-wide Livestock Programme. Coherence across needs and opportunities is achieved not only by ILRI's staff and management, but also by an internationally appointed and cross-disciplinary Board of Trustees representing stakeholders with both research and development perspectives.

The resulting institutional form allows ILRI to be a centre of excellence in providing:

- A flexible framework that can address evolving needs and concerns through new partnerships, including with public- and private-sector entities;
- A long-term clearing-house for livestock knowledge and research in its relation to technical, social and economic objectives;
- An institutional memory and accessible database on livestock issues and answers in developing countries;
- A diagnostic capacity with respect to livestock knowledge and discovery that draws on insights from around the world and across disciplines;
- A means to integrate in a problem-solving format insights across disciplines as diverse as upstream microbiology, genetics, veterinary epidemiology, economics, nutrition and innovation systems science;
- An approach to associating in the same activities both the rigor of scientific hypothesis-testing and the impact-oriented but more pragmatic approaches of action-research in the field;
- A commitment to foster knowledge uptake, diffusion and capacity-building in developing countries.
- A mode of governance that facilitates openness, accessibility and accountability to developing countries.

The implementation plan for the revised ILRI strategy was presented in the last medium-term plan (MTP) for 2004-2006 along with brief general descriptions of the 5 ILRI Projects. Over the past year, the

structure and function of the research programme have continued to evolve. More detailed research plans of Projects and their constituent operating projects have been developed. A summary of these are presented below.

Targeting research and development opportunities (Project 1):

This Project investigates how livestock systems evolve to anticipate where, when and how livestock-related policy and technological interventions can best be targeted to alleviate poverty, sustain rural livelihoods and protect the environment. Research outputs for the operating projects in this Project are:

- *Livestock system evolution:* Activities include identification of drivers of change and their impact on livestock systems in the future; assessment of scenarios of alternative livestock system futures from different livestock development pathways and drivers of change; and analyses of these changes on households and communities across different regions.
- *Poverty, livelihoods and livestock:* ILRI is developing databases and analyses of where significant groups of poor livestock keepers are located. It is also seeking to better understand the relationships between poverty, livelihoods and development strategies, the role of livestock in poverty processes and dynamics, and vulnerability, risk management and livelihood options.
- *Pro-poor options for livestock keepers:* Major activities focus on targeting livestock interventions and identifying their niches and contribution to the livelihoods of poor livestock keepers; targeting systems in which ILRI and partners have the greatest potential for maximizing the opportunities for poverty reduction; *ex-ante* and *ex-post* impact assessment of interventions promoted by ILRI and its partners; and development of priority-setting frameworks for ILRI and/or its partners.

Enabling innovation (Project 2):

Under ILRI's new strategy, priority is being given to efforts to gain a clear understanding of the mechanisms that make research more effective and efficient, knowledge more contagious, processes more inclusive and outcomes more in favour of livestock-dependent poor people. Research and capacity strengthening activities are organized in three operating projects:

- *Innovation systems:* Ideas need to travel from the provider or the innovator to potential users and *vice versa*. Study of past, present and emerging innovation systems will disclose innovation processes and mechanisms that facilitate suitable knowledge exchange, the influence of research approaches on innovation and impact, the measurement and determinants of innovation (indicators and inducers), and how information within livestock knowledge systems is generated, acquired, used and circulated.
- *Research delivery pathways:* This 'action research' operating project consists of a variety of studies in which clients and other actors are directly involved in the identification of constraints and opportunities and the development and testing of methodological, technical and institutional solutions. The case studies focus on the comparison of particular technologies, management strategies and delivery systems in different policy, institutional, socio-economic and bio-physical settings.
- *Innovative partnerships:* Activities conducted under this operating project evaluate the strengths and weaknesses of different types of partnerships in the identification of research needs, research implementation, dissemination and iteration, and the acquisition of funds. In addition, they provide an increased understanding of the institutional and organizational changes that empower different research and development partnerships. Such lessons drive and facilitate institutional change

and capacity building and are a conduit for the promotion of innovative processes that transform the way in which ILRI and its partners go about their business.

Improving market opportunities - Joint ILRI-IFPRI programme (Project 3):

Marketing livestock and their products has long been an essential pathway for income generation and livelihoods for the poor. Research has shown consistently that even the poorest can gainfully participate in livestock markets. Rapidly growing livestock markets in the developing world provide real opportunities but also significant threats to participation of the poor due to structural changes associated with globalization, the increasing concentration of population and production around cities, and a changing regulatory environment. To counter these threats by bringing together their policy and technical capacities from macro- to micro-levels, ILRI and IFPRI have developed a joint programme to improve the market success of poor livestock keepers. This programme has three operating project areas of focus. Each institute will contribute in its area of expertise, achieving synergies across disciplines and research approaches, while avoiding overlaps.

- *Smallholder competitiveness in changing markets*: Although IFPRI and ILRI research in collaboration with FAO and many national partners has demonstrated that smallholders can be more efficient in generating profits per unit output than that large-scale operators in many livestock production activities, it has also demonstrated major differences across farms. There is considerable scope for helping poor and disadvantaged persons who might otherwise be left behind to join a market-driven pathway to improving their livelihoods through livestock. A mix of technical, institutional and policy options are tested and adapted to increase the ability of smallholder and disadvantaged livestock producers to remain commercially viable in the face of changing market requirements and increased competition from imports. The initial focus of this work has been in smallholder dairy systems of Africa and Asia. Increasing emphasis will be given to smallholder poultry and pig enterprises in Asia and Africa.
- *Changing demand and market institutions:* In response to concentrating and rising consumer demand for livestock products in many parts of the developing world, market chains are becoming more concentrated and difficult for independent small-scale operators to function in, chains are becoming longer, individual operators are becoming larger-scale and consumers are becoming more demanding in terms of quality and food safety. This operating project focuses on identification of the driving forces affecting the accessibility of market channels by the poor and disadvantaged and on institutional innovations, technical interventions and other opportunities for helping them respond to new market requirements. This research is also targeted to help poor consumers in urban centres benefit from safer livestock and milk products that might otherwise become too expensive to access in more formal retail channels.
- *Livestock diseases of trade and markets:* Major global procedures and patterns for control of animal disease on a world-wide scale set up in the 1950s and 1960s are under increasing challenge. These include structural changes in the distribution of livestock production and consumption, globalization, changes in technological options for disease control and changes in public acceptance in the industrialized countries of traditional approaches to disease control involving mass slaughters in the event of disease outbreaks. Changing opportunities for export to high-value markets from developing countries are currently leading to disease control strategies that exclude the poor and small-scale sector from livestock production altogether. Several of the many options being discussed for changing methods of

control of trade-relevant diseases such as foot-and-mouth disease (FMD) could lead to a major re-alignment of trade in meat across countries. Especially promising are new frontiers for vaccine development that overcome old constraints in developing countries and new technologies for providing better traceability of products. This project will associate risk analysis from the perspective of veterinary epidemiology with economic research on trade implications of different options for disease control and research on the distributional impact within developing countries of different paths.

Biotechnology (Project 4):

Research in this Project aims to develop and apply technologies that will allow poor livestock keepers to secure their livestock assets through the development and application of biotechnology. Specific applications of biotechnology include better understanding of the diversity and enhanced utilization of indigenous animal genetic resources, and reducing disease and environmental risks through vaccines. Research activities are organized in three operating projects:

- *Improving disease control:* The main focus is on developing vaccines and diagnostics for high-priority animal diseases of the poor to help secure their livestock assets by reducing the impact of disease. ILRI focuses on immunological evaluation of antigens and laboratory and field testing of prototype vaccines. It links with public-sector partners who conduct large-scale genomic screening, with private-sector partners in the development and delivery of vaccine products and diagnostic kits and with NARS for field testing, regulatory approval, quality control and product delivery.
- *Delivery of genetic change:* This operating project focuses on biotechnological applications to secure livestock assets through enhanced adaptive fitness and wider use of more productive and better adapted livestock. The main research activities include: identification and use of genes or genomic regions controlling resistance to diseases and other stresses and those implicated in product quality; and design of genetic improvement programmes appropriate for smallholder livestock systems.
- *Animal genetic resources:* Livestock species in many areas of the developing world have evolved critical adaptive traits such as disease resistance. There is increasing demand for improved understanding and conservation of genetic diversity in indigenous livestock. This operating project contributes to securing the assets of the poor through the conservation of indigenous livestock resources. Molecular markers are combined with phenotypic data to characterize priority livestock species globally. In collaboration with partners from national agricultural research and extensions systems (NARES), this information as well as livestock systems and market information, is used to guide *in-situ* conservation programmes. Capacity building is integrated into all projects. Key research activities include: assessment of the distribution and variability of global livestock populations; identification of unique livestock gene pools; development of tools for molecular characterisation and economic analysis, including valuation, of animal genetic resources (AnGR); and development of databases and decision-support tools for *in situ* conservation, including sustainable use.

People, livestock and the environment (Project 5):

Livestock provide an important entry point into protecting or improving agriculture, environment sustainability and human health and nutrition. This research project focuses on enhancing the role of livestock in contributing to the sustainable livelihoods of poor households, in particular the natural resource and human health assets. The approach hones in on

five major areas of opportunity and, recognising that livestock are always part of a system within each of these areas, concentrates on major hotspots in terms of agricultural system and geographic region. This is intended to facilitate the development and use of integrated, holistic options germane to the needs of end users and the wider range of stakeholders in these existing and emerging systems across the world. Research activities are organized in five operating projects. Two of the operating projects have a systems approach addressing areas of integrated natural resource management:

- *Sustaining water and nutrient productivity:* This activity contributes to increased productivity and sustainability of pastoral, crop-livestock and peri-urban production systems through: improved land use and herd management strategies; enhanced soil nutrient management (nutrient cycling, manure use, etc.); better water management; and overcoming limitations of other scarce resources.
- *Sustaining lands and livelihoods:* Through this operating project, ILRI seeks to improve ecosystem resilience and services through the provision of livestock-based options for enhanced land-use management for the poor in marginal lands. Main activities include: identification of management and policy options for sustainable land use by poor livestock keepers in marginal lands; improved understanding and communication of the implications of livestock and land management in relation to conflict; and capacity strengthening of target institutions and individuals to develop, test and support better strategies and options for sustainable land use and management.

Three operating projects undertake research on more specific components of livestock systems that contribute to health, food, feed and soil fertility issues:

- *Role of livestock in human health and nutrition:* The research examines the role of livestock-related research in securing the poor household's critical human capital assets through improved health and nutrition. Priorities for research to be developed under this new research area include better understanding of the links between animal-source foods, livestock keeping and child nutritional status in poor households, the impact of zoonotic diseases and their control, and designing food safety systems appropriate for informal markets for livestock products.
- *Mitigating feed scarcity:* With agricultural intensification, achieving greater efficiencies and synergies between crop and livestock enterprises is critical. A major constraint to livestock production in crop-livestock systems is feed scarcity. Farmers rely on a variety of approaches to feed their livestock. One key strategy is to feed livestock crop residues. In collaboration with crop breeders, the operating project targets the improvement of key crop species in crop-livestock systems in improving their human food and livestock feed value. Beyond providing technical options, the policy, institutional and market demand issues to promote feed system innovations for wider dissemination are adapted and tested with NARS, NGOs and farmer organizations.
- *Forage diversity:* Research on forage diversity aims to improve utilization of indigenous forage resources through studies on characterization, conservation, dissemination and adoption of forage genetic resources. ILRI together with CIAT and ICARDA to maintain the international forage germplasm collection. This collection is a global public good held in trust under the auspices of FAO. ILRI maintains, develops, targets and distributes forage germplasm and related information.

Summary of 2003 results and 2004 developments

Through the New Partnership for Africa's Development (NEPAD), ILRI is supporting

development of a NEPAD Biosciences Facility. This joint venture, named *Biosciences eastern and central Africa,* will provide a platform of state-of-the-art bioscience infrastructure and services for African scientists to conduct cutting-edge research on the high-priority agriculture problems identified by the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and NARS in the region. In addition, the joint venture will provide a means of quickly building collaboration between African scientists and their counterparts in research institutes and private-sector organizations elsewhere in the world, as well as providing bioscience capacity building. The establishment of the facility has been made possible through funding by the Canadian Government through the Canadian International Development Agency (CIDA). In October 2003, NEPAD and ILRI signed a memorandum of understanding that launched Biosciences eastern and central Africa in Nairobi and provided the contractual framework through which ILRI will host the facility on behalf of NEPAD. The launch of the facility was announced to the NEPAD Ministerial Conference on Science and Technology, Johannesburg, South Africa, in November 2003, and is generating considerable interest among stakeholders, including donor organizations. An implementation team has been established to manage the design phase work plan and implementation arrangements. It is expected that the facility will begin operating by the end of 2004.

Through a grant from CIDA to the Government of Ethiopia, the Ministry of Agriculture and Rural Development (MoARD) requested ILRI to develop a programme to enhance agricultural transformation in Ethiopia. This programme *(Improving productivity and market success of Ethiopian farmers)* is being conducted in collaboration with a wide range of partners, including MoARD, the Ethiopian agricultural research system, CGIAR centres and other international research partners. The project emphasizes four key areas: sustainable livelihood development, knowledge management, policy and institutional development and capacity building. Field activities will take place in 10 pilot learning sites in four regions. The project will strengthen the capacity of Ethiopian institutions, farmers and pastoralists to improve their market success and productivity through access to best-bet technologies, information and knowledge.

The contribution agreement was finalized in June 2004. The project commenced with a two-day technology exhibition organized by MoARD in which technologies from Ethiopian institutions, NGOs and CGIAR centres were displayed. Immediately following, a 3-day project planning workshop was held at ILRI's campus in Addis Ababa, marking the beginning of the project's 5-month planning phase.

Programme highlights

The following is a selection of ILRI's 2003 programme results and 2004 developments:

Project 1: Targeting research and development opportunities

- ILRI provided technical backstopping in analysis and production of a book on *Geographic dimensions of well-being in Kenya: Where are the poor? From districts to locations. Volume 1.* This study includes analysis of poverty measures – poverty incidence, contribution to poverty and poverty gaps – poverty profiles, and poverty maps at sub-district level for Kenya. The book has been widely disseminated to policy makers, parliamentarians, district level staff, donors and other development partners. The results, particularly the poverty maps, have generated considerable interest and comment from a range of development partners and civil society. The Government of Kenya and development partners are using the findings to

design, implement, monitor and evaluate evidence-based poverty-reduction interventions at national and sub-regional levels. This work has been extended to Uganda, where new sub-district poverty maps have been completed and are being published. A study to assess the impact of this analysis has been initiated.

- Linked to the more general poverty analysis described above, a participatory study of the pathways into and out of poverty, and the role that livestock play in those pathways, was completed in western Kenya. Access to health care appears to be strongly associated with pathways for stopping households from descending into poverty in this region. Livestock is also associated with movement of households into and out of poverty. The communities agreed that a key means of moving out of poverty was diversifying their farm income, including through incorporating livestock enterprises into their production systems. A subsequent article in Kenya's *Nation* newspaper has stimulated debate among Kenyans about the custom of slaughtering livestock for funerals. A second article discusses this issue and findings from follow-up interviews in more detail.
- Analysis of the linkages between changing land use, biodiversity and land degradation in Kenya was completed. Fifteen additional working papers were completed, reviewed, published and posted on the Internet. The outputs of the research were disseminated to policy makers, researchers and academics in Kenya, Tanzania, Uganda, France and the United States. Dissemination activities included feedback workshops with policy makers, farmers and herders in Tanzania and Uganda. The results were presented at several regional and international fora and were also used in designing a Global Environmental Facility (GEF) project on sustainable land management.

Project 1 developments for 2004 include the following:

- Projections on length of growing periods and livestock population to 2050 are nearing completion. These spatial data are being mapped and the results of the analyses written up. These projections provide key data that will be used for decision making on development domains, investment priorities, targeting interventions and strategy development. The Forum for Agricultural Research in Africa (FARA) is using these analyses in site selection, formulation of hypotheses, identification of entry points and prioritization of scientific interventions in the development of a Sub-Saharan Africa Challenge Programme.
- Scenario analysis is being used to determine development paths for agriculture in the Kenyan highlands over the next 15 to 20 years to identify patterns of systems evolution and trajectories of change in crop livestock systems and to elucidate the main driving forces of change. Spatial models are used to examine relationships between the driving forces and changes in economic welfare and system sustainability in targeted sites. Stakeholders workshops will be held to consult with partners in crop-livestock development regarding country ownership and development of strategies for dissemination and uptake of the outputs by end users.
- A framework for priority setting was developed to support the programmes and networks of ASARECA. This framework enables ASARECA and other research and development institutions in Africa to better target investments and engage in dialogue with development partners in determining strategic research directions that benefit poor people.
- A framework for assessing the impacts of feed resources in smallholder systems is being developed in collaboration with other CGIAR centres

and development agencies under the auspices of the SLP. This framework should provide a basis for the CGIAR to evaluate the socio-economic, institutional and environmental impacts of implementing different kinds of interventions (e.g., management practices, genetic improvement, improved feed systems, marketing opportunities) related to food-feed and forage crops in targeted systems.

Project 2: Enabling innovation

- An ILRI review paper on socioeconomic and cultural factors in the research and control of trypanosomosis has become a largely quoted reference on the subject.
- A rapid appraisal of the current status of an infection and treatment method (ITM) of immunizing cattle against East Coast fever (ECF) confirmed the importance of ECF as a constraint to livestock development, the inadequacy of current control methods and that demand exists for the vaccine in Uganda. A field trial was initiated in pastoral areas in Kenya by an NGO, with ILRI providing technical support to evaluate the efficacy, safety and demand for ITM in pastoral areas in Kenya.
- An epidemiological and socioeconomic study of the impact of ECF under pastoral production systems was completed in northern Tanzania. Decision-support information on ECF transmission, the impact and market potential of ITM and barriers to its delivery in local settings was collected and prepared for dissemination to livestock owners.
- Best options for community-based mechanisms to support farmer livestock health strategies have been identified and introduced in Ethiopia
- A rapid diagnostic protocol was developed in West Africa that permits national researchers easily to assess suspected hot spots of trypanocide resistance. Promotion of rational drug use has been identified as a more promising longer-term strategy for reducing the risk of trypanocide resistance than community-based tsetse control, which has been shown to be inherently unsustainable.
- The application of Farmer Field School (FFS) methodology to livestock continues to increase. Several requests have been received from research institutes, development programmes and the private sector in sub-Saharan Africa (SSA), Asia and Latin America to support the implementation of FFS for health and production.
- ILRI held a training workshop on engaging dialogue with policy makers in IRRI, at Los Baños, in collaboration with the University of the Philippines Los Baños Institute of Strategic Planning and Policy Studies for research managers and scientists to develop a policy brief and a policy advocacy plan using their current research as example.
- A similar workshop in Vietnam discussed policy and institutional issues directly addressing the concerns of smallholder livestock producers.
- A policy study in South Vietnam assessed the impacts of prevailing credit policies and delivery systems on the ability of smallholder livestock farmers to access credit and adopt productivity-enhancing technologies for improved livestock production.
- Investigations into the prevailing policies on extension delivery and their implications on the economic viability of smallholder livestock production were carried out in The Philippines. A case study revealed that the livestock sector receives a dearth of attention in terms of budget, manpower, legislation, training programmes and support services.

Developments for 2004 include the following:

Innovation systems: A new development for 2004, this operating project has been forging strategic alliances with key partners such as the SROs, NARES, Prolinnova

(Promoting Local Innovation), ISNAR and the United Nations University-Institute for New Technologies (UNU–INTECH). This has resulted in the initiation of several activities to identify and describe different types of livestock-related innovation systems and to determine the roles of different actors in these systems to identify what would be required to facilitate their functioning/delivery rates and institutionalization. A review of past livestock innovation successes and failures to identify "lessons learned" will be completed later this yea as part of these activities. A major activity under development seeks to contribute to enhancing the livelihoods of the poor by disseminating new knowledge through sustainable and cost-effective livestock-oriented media, advisory support tools and information exchange channels in a range of farming systems and socioeconomic/gender categories in East Africa.

A '*dairy toolbox*' will be developed by the end of the year funded by the Livestock Production Programme of the Department for International Development (DFID) of the UK. The electronic toolbox will be a package of information and simple decision-support tools targeted primarily at extension staff. At the same time as information materials are being developed in India and Kenya, formal linkages have been established with the ICRISAT/IWMI/ILRI Virtual Academy for the Semi-Arid Tropics (VASAT). Led by ICRISAT from Hyderabad, the VASAT is based in India and West Africa and will facilitate linking the toolbox to users. Further funds will be sought to test the product in 2005.

Research support to development activities of Land O' Lakes, World Wide Sires and American Breeding Services (ABS) continues in the Kenya Dairy Development Project under USAID funding. The project has been working with breeding service stakeholders to provide information to inform partners what activities and policy issues to target. A stakeholder forum presented preliminary findings and agreed that blanket promotion of artifical insemination (AI) across the country was inappropriate. Recommendations were made on how to improve targeting of appropriate services and existing AI provision. A policy brief is being prepared.

A study on smallholder family poultry development is under way to assess all on-going activities, especially those related to production and the social impact of micro-finance initiatives. Using FFS experience and the Bangladesh model, ILRI will develop a smallholder poultry model applicable for the poorest communities in Kenya.

Launching and implementing activities of the ASARECA Animal Agriculture Research Network (A-AARNET) are planned under programme support provided ASARECA by the European Development Fund of the European Union (EU/EDF). Major activities on the 2004 work programme include completing a priority-setting process for animal agriculture research and development in East and Central Africa, facilitating A-AARNET scientists and their partners to develop proposals for competition under the ASARECA competitive grant system, strengthening ILRI/NARS partnerships in ASARECA region through joint planning and implementation of collaborative research activities, strengthening NARS capacity for livestock research in the ASARECA region through training and provision of specialized information, and exploiting opportunities for ILRI/NARS partnerships in proposal development and implementation in West, Central and Southern Africa.

Project 3: Improving market opportunities

- *Insights from comparing dairy growth in East Africa and South Asia*: In collaboration with the Pro-Poor Livestock Policy Initiative of FAO (FAO/PPLPI), ILRI has undertaken a comparative analysis of the sources of dairy-sector growth in five South Asian and seven East African countries since

the early 1970s. A key difference is observed between the two regions. Demand-related factors explain most inter-country differences in growth of production *per capita* in East Africa. The key to dairy promotion in East Africa appears to be the ability to adjust supply to the type and quality of products demanded, keeping consumer prices low through avoiding formal-sector processing or other interventions that raise retail prices to the urban middle class and poor and through reducing the transaction costs of marketing smallholder perishable produce. Consumption of dairy products is higher in South Asia than in East Africa, and demand-related factors have been contributing to growth in the dairy sector for the past 30 years in all countries. Inter-country differences in growth within South Asia are primarily explained by the approach taken to expand supply to match growing demand. India and Pakistan succeeded in promoting growth in milk production per worker through improved technology and better access to inputs. The dairy sectors in Nepal, Bangladesh and Sri Lanka also faced growing demand but were unable to intensify or expand supply. Imports rose substantially in the latter two countries.

- *Development of an integrated training, technology and regulatory strategy to improve small-scale traditional milk marketing in Kenya*: ILRI has long been involved in action-research to improve the position of small-scale farmers within the supply response to surging demand for dairy products in East Africa. An integrated package has been developed with national partners in Kenya that consists of a training module, an improved milk can developed with small traders, and guidelines for standards regulation and monitoring. The package is now being out-scaled (in collaboration with Project 2—see above) though several NGO-led dairy development projects. The improved milk can is being promoted in East Africa by a private manufacturer. Key to the success of these interventions has been changing perceptions and awareness among national policy makers and stakeholders of the important role of small-scale traditional traders in both marketing milk and generating employment. Using results of similar work in Ghana and Tanzania, the package is now being generalized for application across sub-Saharan Africa.
- Information gathered in a marketing study in Tanzania and Ghana emphasized the viability of small-scale milk production and marketing to support rural livelihoods of farmers and market agents but identified the need for further training in hygienic milk handling.

Project 3 developments for 2004 include the following:

- *"Economies of scale"* turned out to be a weak assumption about the future of dairy in East Africa and South Asia. Within a broader collaboration with IFPRI and the CGIAR System-wide Livestock Programme (SLP), ILRI collaborated with national institutions in Kenya and Bangladesh on a cost-route survey of a range of sizes and types of dairy farms. Results suggest that smallholders are relatively competitive within the range of very small to medium-sized commercial farms studied. This result is confirmed by separate work with national institutions, IFPRI, and FAO in India on both small- and large-scale farms. In fact, small-scale dairy producers in some cases are able to consistently undersell larger-scale farmers over time because of lower unit costs and taste preferences. However, many small farmers operate well below potential efficiency levels because of limited access to services, credit and cooperative support and marketing, indicating scope for further gains through appropriate interventions at the farm level. Furthermore, there are considerable differences across farms,

even in the same location, with respect to access to markets and premium prices, suggesting the importance of looking at institutions to improve market channels for smallholder production.

- *Extending solutions for smallholder dairy in East Africa:* The Smallholder Dairy Project (SDP) in Kenya, led by the Ministry of Livestock and Fisheries Department in collaboration with the Kenya Agricultural Research Institute (KARI) and ILRI, is in its final year. Eight years of activities are culminating in significant policy impacts and important lessons learnt about linking research outputs to policy impacts. A major policy forum attended by many of Kenya's high-level policy makers was held in May. The past eight years of activities, involving key stakeholders such as the Kenya Dairy Board and public health officials, have led to an evolving change in mindsets. Dairy sub-sector stakeholders now recognize the importance of the informal market and of developing policies that take account of both large and small players. Policy advocacy work under SDP has fed into a regional initiative, called the Eastern and Central Africa Programme for Agricultural Policy Analysis (ECAPAPA), to harmonize dairy policies across East and Central Africa. SDP staffs from ILRI and the Ministry are working with a group of regional partners to analyze and synthesize information to identify common policy reforms required to strengthen the dairy sub-sector in the region. Building on activities in Kenya, Ghana and Tanzania, generic training guidelines are being developed that will be promoted by FAO internationally as well as regionally through ECAPAPA.
- *The costs of compliance with SPS in the Horn of Africa:* In collaboration with the World Bank, ILRI has undertaken as assessment of the costs of the ban of livestock trade from Ethiopia to the Arabian Peninsula and the costs and benefits of control options to meet sanitary and phyto-sanitary (SPS) trade requirements. Analysis of different options for investment in health and infrastructure to improve quality and regain the market shows that such investments are likely to be highly profitable. Such investments might be financed by a variety of instruments such as an export tax or a domestic sales tax and by market pricing of required inputs. The report analyses the implications of different options for cost recovery.
- *Improving livestock market opportunities in West Africa:* Research on a collaborative project on markets with the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) was wound up in 2004. The main conclusion was that the lucrative part of livestock trade in the Sahel started once coastal markets were accessed, but that the requirements for market entry to the cross-border trade were far more restrictive than for domestic trade. Transportation and handling costs for livestock were high, but not inordinately so given the state of infrastructure in the central corridor and costs for other products. On the other hand, official taxes and fees amounted to 28% of total livestock marketing costs, and unofficial taxes and fees further reduce the competitiveness of Sahelian products in coastal markets. Access to substantial capital and reliable market information were the distinguishing characteristics of successful cross-border traders. Interventions in these areas as well as reduction of both official and unofficial taxation will be necessary to broaden the market, reduce costs and reinforce the competitiveness of Sahelian products in coastal markets.
- *New work on markets and animal disease control launched in the Near East-North Africa (NENA) region:* This 3-year activity is undertaken jointly with ICARDA in Jordan, Tunisia, Syria

and Sudan and concerns improvement of the health of small ruminants for increased commercialization of the small-farm sector. A coordinator was recruited and placed at ICARDA in Aleppo and memoranda of understanding were signed with NARS in the four countries. Tasks include: (a) Analysis of the delivery of animal health and other essential services in communities within targeted small ruminant farming systems leading to identification of 'best-bet' strategies. (b) Assessment of risk and development of disease control strategies at sub-national, national and regional levels through epidemiological and socioeconomic analyses that ensure/enhance market access for poor small ruminant farmers. (c) Support for regional, national and local capacity for disease diagnosis and development of control strategies. (e) Assessment of markets to improve information, efficiency and access for poor farmers.

Project 4: Biotechnology

- A successful review meeting of the ECF vaccine activities was held in December 2003. During the meeting, plans were developed for a large-scale trial to assess the 5 most-promising candidate antigens with different vaccine vector systems *in-vivo* using immune response parameters elicited by live vaccine challenge.
- A collaborative research agreement has been reached between ILRI and Agen Biomedical Ltd, Brisbane, Australia, jointly to develop point-of-care diagnostic tests for the major livestock diseases. An initiative to develop an enzyme-linked immunosorbent assay (ELISA) for livestock trypanosomosis will be the first activity of this partnership.
- Several key partnerships with advanced research institutes, national research centres and the private sector were forged in 2003 to develop joint funding proposals for submission to the Wellcome Trust and the United States Agency for International Development (USAID). Subsequently, proposals seeking to develop improved vaccines against various diseases have been submitted.
- First phase of the genetic characterization of chicken populations from Africa and Asia has been completed. Preliminary results revealed two major centres of domestication for chickens in Asia. The results provided evidence for influences by both domestication centres on African chicken populations. Genetic diversity in African chicken populations is high, indicating potential for genetic improvement programmes targeting African rural chicken populations.
- A survey of the genetic diversity of the Yak populations of Central Asia and the Himalayan region was completed. This represents the first comprehensive analysis of the distribution of the genetic diversity of a livestock species over nearly its entire geographic distribution. These results may inform the design of *in situ* genetic improvement breeding strategies that maximize diversity.
- Putative trypanotolerance quantitative trait loci (QTL) were mapped in 18 cattle chromosomes in a second generation (F2) N'Dama x Boran resource population. Results are consistent with a single QTL on 17 chromosomes and two QTLs on one chromosome. Nine QTLs were significantly shown to have an N'Dama origin and five QTLs to have originated from the Kenyan Boran. There is evidence of an overdominant mode of inheritance in four QTLs.

Project 4 developments for 2004 include the following.

- Conversion of the provisional patents for the ECF research into substantive patents, lodged in July 2003 with a US Patent & Trademark Office, has been completed.

- The ECF vaccine screening trials planned in December 2003 have been conducted; results will be available in the third quarter of 2004. These results will guide subsequent efficacy experiments. The next project review is planned for the fourth quarter of 2004.
- DAGRIS (Domestic Animal Genetic Resource Information System), a globally accessible information source on genetic and phenotypic characteristics of livestock freely accessible on the Web, will be extended to Asia and will include chickens (the system currently covers only ruminants).
- Genetic screening for the identification of chromosomal regions conferring resistance to gastrointestinal parasites (nematodes) in African sheep (Red Maasai) will be expanded to the entire genome, providing for the first time (in small ruminants) an indication of the minimum number of genes involved in the control of resistance to parasitic infection.
- Initial results of mapping the genes of indigenous African sheep that control resistance to gastrointestinal helminths confirmed one of two genomic regions previously identified. A major genotyping initiative will continue at ILRI and partner laboratories to complete the genome-wide search for new QTLs controlling resistance to gastrointestinal nematode infections in sheep.

Project 5: People, livestock and the environment

- ILRI and partner scientists worked together with Maasai groups to conduct the first comprehensive wildlife survey in the Maasai Mara ecosystem. Survey results were reported in June 2003 (see report and maps at www.maasaimaracount.org). Results are now being used to frame new management and policy strategies for this ecosystem and similar livestock pastoral-wildlife systems in East Africa.
- Using modelling, a global analysis of the potential for reducing greenhouse gas emissions showed that there may be great biophysical potential for additional carbon sequestration in the world's vast pastoral lands. Institutional and social constraints need to be considered. Success will most likely be achieved where efforts strongly build on local institutions and knowledge and where pastoral communities see substantial benefits to participating in carbon mitigation efforts.
- ILRI initiated a new research programme devoted to (a) enhancing the human health and nutritional benefits of livestock keeping for low-income households and (b) mitigating health risks to the poor associated with livestock and their products. To address these new challenges, ILRI will seek to leverage its expertise in livestock research through partnerships with established leaders in public health research.
- A workshop for African forage experts was held in June 2003 to collect information on development of a knowledge system for selecting forages for tropical farming systems. The experts provided information on adaptation of forages for a range of farming systems and agroecologies. Additional information is being collected from grey and published literature. The knowledge system will be launched in 2005.
- Activities were continued in Nigeria and India to improve livelihoods of poor livestock keepers by increasing the productivity of their livestock and the sustainability of their farming systems through adoption of fodder innovations. Country studies were conducted to identify potential partners and national stakeholder workshops were held in Nigeria and India. Baseline data on current feeding practices and livestock production activities were collected. Subsequently, participatory testing of different food-feed crop, forage and

fodder options by farmers was conducted and alternative dissemination pathways for these different options were investigated in India and Nigeria.

- Research on cultivars of pearl millet grown in India showed that those with higher stover fodder value can be selected without detriment to grain yield. Results provide opportunities for further genetic enhancement of stover fodder quality. Studies on variations in stover quantity and quality traits in sorghum varieties and hybrids, using cultivars in a sorghum improvement program in India, identified superior dual-purpose cultivars, which farmers preferred over the locally grown ones. Similar studies identified four groundnut cultivars that maintained good pod yield and high haulm quality and quantity under adverse conditions. These were disseminated in three villages in India using village-level seed multiplication.
- ILRI is supporting the CGIAR Systemwide Initiative on Malaria and Agriculture (SIMA) to develop research related to cattle management and use of topical insecticides in cattle to reduce malaria transmission to people. The research partnership includes ILRI, IWMI, CIAT, ICIPE, Farm Africa, Natural Resources Institute (NRI, UK), Kenya Medical Research Institute, Livestock Health Research Institute (Uganda) and Lake Kariba Research Station of the University of Zimbabwe).

Project 5 developments for 2004:

- As part of the *"Comprehensive assessment of water management in agriculture",* ILRI continued its research on livestock management associated with community-based irrigation systems in Ethiopia. At least five master's theses along with other analyses will provide more in-depth understanding of how investments in community-based irrigation systems could be better designed and managed to accommodate the livestock keepers who are and will be users of the systems.
- New analyses of the trade-offs between poverty reduction and wildlife conservation in East Africa revealed an elusive win-win: innovative environmental payment schemes double the incomes of the poorest households when they need it most during droughts and conserve wildlife and livestock grazing corridors for the benefit of pastoralists, their livestock and wildlife alike.
- ILRI has begun playing a key facilitation role to support research efforts in Africa and globally to raise awareness about the growing threat to human health of cysticercosis caused by a pork tapeworm. A senior researcher in veterinary parasitology, seconded from Denmark to lead this work at ILRI, has organized an international conference in Italy in September to initiate a global control campaign.
- To guide development of its new research programme on the impacts of livestock keeping on human health, state-of-the-art reviews are being conducted on the links between livestock keeping and nutritional well-being among the poor and the role of livestock in coping with HIV/AIDS. ILRI has also initiated activities in Ethiopia focusing on the nutritional impact of animal-source foods in weaning-age infants.
- ILRI continued to maintain its commitments under the in-trust agreement with FAO and is upgrading and strengthening forage genebank operations with additional staffing, facilities and an increased level of activity with funding from World Bank. This will allow ILRI to reduce backlogs in managing the forage germplasm collection and improve the quality and

availability of information about the in-trust collection.

Highlights of the 2005 project portfolio and measures of progress and achievement

As in the 2004-6 MTP, the overall trends in the ILRI portfolio will be to:

- maintain a strong emphasis on sub-Saharan Africa while increasing activities in South Asia;
- increase emphasis on smaller livestock species;
- maintain emphasis on mixed crop-livestock systems and pastoral systems in Africa while increasing work in peri-urban and landless systems; and
- prioritize the needs of poor women.

As noted above, Project strategies and plans have evolved over the past year and new projects are being developed to fit these strategies. Partnerships and capacity building remain integral parts of research project planning. Two Centre-Commissioned External Reviews are planned for late 2004, one in capacity building and one for biometrics support. Considerable efforts are being made for operating projects within Projects to work creatively across Projects in joint research activities and fund raising. Changes planned for Projects in 2005 are noted below.

Project 1: Targeting research and development opportunities

- Given the dynamic nature of livestock systems, in terms of both production and consumption, renewed emphasis is being placed on better understanding the evolution of livestock production systems. This will build on previous descriptive studies of livestock systems and comparative analyses of crop-ruminant systems across Africa, Asia and Latin America. As part of this process, a workshop on alternative futures for livestock development and implications for livestock research will be held in 2005.
- Methodologies developed and applied in Kenya to assess pathways into and out of poverty and the role of livestock will be conducted in other sites to capture broader livelihood and vulnerability lessons. Studies at the next site will be conducted in collaboration with FAO and local partners in Peru.
- Given the need of ILRI and its partners to better target technical interventions, a greater number of *ex-ante* impact assessments, with increased emphasis on poverty outcomes have been planned. These will begin with assessments of animal health and food-feed crop interventions, the latter in collaboration with other crop centres through SLP and with Project 5.
- Progress in poverty-livestock studies has been excellent. Significant demands for poverty mapping and analysis methodologies are expected. The rate at which they are more widely disseminated and adopted will depend on funding. The same is true for participatory poverty study methodologies. New project activities in systems evolution and *ex-ante* impact assessments will be judged by the quality of their conceptual and methodological developments in 2005 and by specific research outputs and their adoption in 2006 and beyond.

Project 2: Enabling innovation

A major proposal on HIV/AIDS and livestock is under development. The project seeks to contribute to an enhanced understanding of the impact of the HIV/AIDS epidemic on how livestock contribute to the livelihoods of rural poor. It will identify practical ways in which livestock can better support livelihood strategies in households affected by HIV/AIDS and how such information can be disseminated within both HIV/AIDS and livestock dissemination and knowledge exchange mechanisms (processes, media, channels, key players and organizations).

Project 2 is also pioneering some institutional innovations, particularly with respect to the ILRI Debre Zeit Station in Ethiopia. ILRI's long-term vision is for Debre Zeit to become a 'prototype' for a new type of rural extension centre, promoting new and practical methodological and process approaches for rural innovation. These would include participatory farmer testing of technologies, different research and training methodologies and processes, rural enterprise and skills development and different technologies, media and processes for rural knowledge management and information exchange. This station will support a variety of Ethiopian organizations as well as serve as a rural innovation facility for the broader IARC and partner community in sub-Saharan Africa.

Project 3: Improving market opportunities

This Project, operated jointly with IFPRI, began at the time of submission of the 2004-2006 MTP. Initially activities were largely those from existing ILRI projects. Aided by a wide external consultation and a Project advisory committee consisting of management representatives from ILRI, IFPRI and FAO, a more unified approach bringing together technical and policy issues has emerged.

Relative to ILRI's 2004-2006 MTP, Project 3 has consolidated 10 stated outputs into 3 objectives (plus capacity building), and has expanded 1 general indicator for these outputs to 11 specific and monitorable indicators, The three new over-arching research outputs are presented in Annex 1.

Work is being initiated on activities contributing directly to all three outputs. Most notably, significant effort has been devoted to extending the approach to smallholder dairy development in East Africa to similar issues in South Asia, and to building a programme of research on the impact of contract farming of livestock in Asia on small-scale production. Both of the above primarily contribute to output 1. Both are done collaboratively with FAO. The work on contract farming is especially likely to identify improved pathways for the increased participation of smallholders in rapidly growing urban and export markets for pigs and poultry in Southeast Asia.

New efforts are being made to build a programme of research with IFPRI and FAO around output 2, based on both new fundraising and new staffing. The initial focus will be on milk safety issues in smallholder systems and implications for smallholder market access. A major proposal has also been submitted to the International Fund for Agricultural Research (IFAD) in collaboration with the International Trypanotolerance Centre (ITC), in West Africa, to look at the impact of urban food safety concerns on traditional urban market channels for livestock products.

Work has been initiated with FAO and IFPRI on output 3, with a desk study of cross-country SPS issues and the likely impact on developing countries of changes in OECD regulations with regard to animal imports. In addition, there has been a significant investment of staff time in participating with major hard-science labs around the world in a new $70 million proposal for a Global Alliance on FMD Research, which focuses on vaccine development. ILRI leads the social science/policy part of the proposal with a view to identifying opportunities to make innovations of the project more pro-poor.

Project 4: Biotechnology

The Project 4 portfolio remains virtually unchanged from the 2004-6 MTP. Research on vaccines and diagnostics, conservation of genetic resources and livestock genetic improvement continues as planned. Major funding raising efforts have been made in these areas over the past year (with the success of many of these known in 2005).

Project 5: People, livestock and the environment

Two strategic changes from the Project portfolio presented in the 2004-6 MTP have been made. The first is that two systems research operating projects have been formed. The first operating project focuses on improving and sustaining water and nutrient productivity in livestock systems. The second investigates land use and land management issues, largely in pastoral and crop-livestock systems.

The second change is in research on food-feed crops. This work has been realigned to consider the broader issues of mitigating feed scarcity, a strategy that takes account of the diversity of livestock feeding systems and the need to target such research to end-user strategies. This activity is done in collaboration with Project 1 and the SLP. The other focus on the feeding strategies research is to better understand farmer and other demand for different feeding options and how this demand can be met through different delivery pathways, institutional partnerships and information exchange strategies. This research is conducted with Project 2 and the SLP.

Research in the area of human health and nutrition continues to evolve with strategic partnerships being made both within ILRI (especially Project 3) and with new partners outside the institute. A focus on cysticercosis as both a specific disease of the poor and a model system has emerged. The need to synthesize key information on the role of livestock in human nutrition and in households suffering from HIV/AIDS forms a priority area for 2005.

Collaboration highlights

ILRI will continue to work through collaborative arrangements to provide expertise in livestock and livestock-related research, strengthening and deepening its partnerships with key livestock research and development institutions and organizations. A fundamental change in culture and process is envisaged to support innovations at all levels, from individual livestock keepers to national and international decision makers. Several types of partnerships, traditional and non-traditional, will be strengthened. Traditional partnerships with NARES and CGIAR partners will continue to be built upon.

Linkages with the private sector and NGOs are becoming increasingly important to ILRI's development and delivery of products from its research. Diagnostic tests for four tick-borne diseases have been developed and validated by ILRI and partners. Through a public-private partnership arrangement, ILRI has transferred the commercial production and distribution of these kits to Svanova Biotech AB, a company based in Uppsala, Sweden.

System-wide and ecoregional programmes (SW/ERP)

The most effective way of addressing poverty through livestock research at a global level is combining, in a research consortium approach, the efforts of international centres and their local partners. Such an approach allows for sharing institutional resources and cross-fertilization of experiences from one geographic area to another. The CGIAR has established a global livestock research mechanism based on inter-centre collaboration through its System-wide Livestock Programme.

The SLP builds upon the expertise and investments of the CGIAR centres on food crops, natural resource management and policy/institutional analysis. It levers existing CGIAR system resources to address the global research needs of small-scale crop-livestock in a coherent and integrated manner. The members of the SLP include CIAT, CIP, CIMMYT, ICARDA, ICRAF, ICRISAT, IITA, IFPRI, ILRI, IRRI, IWMI and their partners. IWMI became the 11th member of the SLP in 2003 bringing the Programme expertise in improving the productivity of food-feed systems through

more efficient use of water and other natural resources.

ILRI as the convening centre provides administrative support to the Programme and serves as its representative to the CGIAR members. The proposed Medium Term Plan 2005-2007 for the SLP follows a review of its strategy by the inter-centre Livestock Programme Group (LPG) in 2003.

SLP highlights in 2003

For the SLP to contribute more effectively to the CGIAR goals and the Millennium Development Goal of reducing poverty, the inter-centre LPG revised its strategy. The strategy now focuses on improved food-feed systems as a key entry point for increasing the productivity and enhancing the natural resources that sustain small-scale crop-livestock agriculture. It builds on initial work done by the SLP and its centre members in incorporating feed-related traits into the genetic enhancement and crop management programmes of key food crops. Research achievements in food-feed systems by its CGIAR centre members and their partners were highlighted in a special issue of the journal Field Crops Research on "Approaches to improve the utilization of food-feed crops" (Volume 84, Issues 1-2, October-November 2003).

The SLP initiated new strategies to disseminate fodder technologies that enhance the livelihoods of small-scale farmers. In collaboration with other CGIAR centres, NARS and research institutions of developing countries, a special issue on "Forage Demand and Adoption of Smallholder Livestock Keepers" was published in the journal *Tropical Grasslands* Volume 37, No 4, December 2003.

SLP developments in 2004:

Guided by the revised strategy for the SLP and through a competitive mechanism, six seed grants were allocated to develop larger projects on water in crop-livestock systems in SSA and Asia; sweet potato-pig systems in South East Asia; rice-livestock systems in Asia and SSA; pigeon pea in crop-livestock systems in Asia, SSA and LAC; sorghum in semi-arid crop-livestock systems in West Africa; and grass pea in food-feed systems in West Asia and North Africa (WANA). ILRI has initiated development of a framework and model for assessing the potential impacts of options to improve food-feed systems.

A workshop to synthesize lessons learnt on approaches for targeting and scaling out fodder technologies will be held in the last quarter of 2004.

ILRI continues to expand collaboration through system-wide initiatives and eco-regional programmes led by other CGIAR centres (see Box 1).

ILRI also contributes to a number of CGIAR system initiatives such as the Consortium on Spatial Information, the Gender and Diversity Programme, the Integrated Natural Resource Management Group, and the Inter-Centre Working Group on Climate Change.

Box 1. ILRI's participation in CGIAR system-wide and eco-regional programmes

Collective Action and Property Rights (CAPRi), led by IFPRI

Participatory Research and Gender Analysis Programme, led by CIAT

System-wide Genetic Resources Programme (SGRP), led by IPGRI

Urban Harvest, led by CIP

Systemwide Initiative on Malaria in Agriculture (SIMA), led by IWMI

System-wide Livestock Programme (SLP), led by ILRI

Deserts Margin Programme led by ICRISAT

ILRI has developed two large collaborative projects with partners in different sub-regions (CASREN in southeast Asia and a livestock market project in Central America funded by the Common Fund for Commodities (CFC)). It belongs to a

number of larger consortia in different research and development disciplines including the Integrated control of Pathogenic Trypanosomes and their Vectors (ICPTV), the Integrated Tick and Tick Borne Disease Control (ITTBDC), FAO's Pro-Poor Livestock Policy Initiative (PPLPI) the Livestock Environment and Development (LEAD) initiative and the African Livestock (ALive) initiative. In addition, it actively supports the activities of regional and sub-regional agricultural research organizations including the Association for the Strengthening of Agricultural Research in Eastern and Central Africa (ASARECA), the Conseil Ouest et Centrale Africain pour la Recherche et le Développement Agricole (CORAF), the Forum for Agricultural Research in Africa (FARA), and the Asia-Pacific Association of Agricultural Research Institution (APAARI). ILRI also plays a strong role in providing technical support and advice for NEPAD.

ILRI hosts staff and programmes of a number of CGIAR institutes and international organizations, both in Kenya (African Agricultural Technology Foundation [AATF], CIP, ICRISAT, IITA, International Service for the Acquisition of Agricultural Biotechnology Applications [ISAAA]) and in Ethiopia (CIAT, CIMMYT, ICRAF, ICIPE and IFPRI, including hosting the ISNAR programme in Addis Ababa).

Challenge programmes (CP)

The Water and Food CP

Since the last MTP, the ILRI-led proposal, "*Increasing water-use efficiency for food production through better livestock management - the Nile River Basin*" was approved with US$970,000 of committed funding coming from the Challenge Programme on Water for Food (CPWF). In March 2004, ILRI hosted the first planning meeting in Addis Ababa that included stakeholders from Sudan, Ethiopia and Uganda. ILRI also received a small grant from the CPWF through IRRI to prepare a background paper outlining a conceptual framework for assessing livestock-water productivity. This paper is scheduled for submission to a journal in the second half of 2004 and will be one of several background papers to be presented at an inception workshop scheduled for late 2004 or early 2005.

Proposed sub-Saharan Africa (SSA) CP

Together with other CGIAR centres, particularly IITA, ILRI continues to provide expert input and comments into the development of the SSA CP proposal being coordinated by FARA. ILRI has provided input in the selection of an initial three pilot learning sites using spatial and non-spatial data and is involved in the identification of partners and their roles. ILRI plans to be closely involved in the further development of the CP, both in the overall process and in the development of research activities in the proposed pilot learning sites in East, South and West Africa.

Centre staffing highlights

ILRI continues to explore innovative arrangements to engage senior scientists from around the world in its research agenda. Currently, ILRI has joint appointments with CIAT, ICARDA, ICRISAT, IFPRI, IPGRI and Veterinaires Sans Frontieres - Belgique (VSF–B). ILRI also has joint appointments with the University of Nairobi and KARI in Kenya.

Under its revised strategy, ILRI's organizational structure has continued to evolve. The recruitment of the Deputy Director General-Research (DDG-R) and five Theme Directors was completed in late 2003: John McDermott as DDG-R, Ade Freeman for Targeting Research and Development Opportunities, Jeroen Dijkman for Enabling Innovations, Christopher Delgado for Improving Market Opportunities and the Joint ILRI/IFPRI Programme on Livestock Markets, Edward Rege for Biotechnology, and Shirley Tarawali for People, Livestock and the Environment.

Recruitment to replace Getachew Engida, former Director of Finance, Human Resources and Administration, is currently under way.

The NEPAD-supported Biosciences eastern and central Africa was launched in 2003. An implementation team has been established to manage the design phase work plan and implementation arrangements.

Costing centre projects

Innovative ways of funding positions

Beyond traditional mechanisms to obtain research funding for large programmes and specific research projects from traditional CGIAR members as well as non-traditional donors, ILRI is focusing on two innovative ways of funding its research programmes. The first is in the area of human resources. ILRI has been successful in obtaining funded or partially funded positions through the Centre for International Migration (CIM).

Another area of funding innovation has been to share the costs of expensive laboratory and other support infrastructure. Agreement on the grant for the NEPAD Biosciences eastern and central Africa joint venture reported during the last MTP has been concluded and funding and work has commenced. Given the high costs of financing the infrastructure and operations for doing cutting-edge science in Africa, this arrangement holds considerable promise for providing a win-win situation of providing access to modern molecular biology facilities for partners throughout Africa and sharing these costs over a wider partner base. We also see increased opportunities for working through public-private partnerships, building on our experience in ECF vaccine development. At the ILRI campus in Addis Ababa, a number of additional CGIAR and non-CGIAR partners now share the facilities, decreasing overall costs to all, as well as enhancing research cooperation and synergies.

Centre financial health indicators

The funding environment is similar to that of previous years, with pressure on unrestricted funding continuing to increase. The Board and Management continue to emphasize and spend considerable time on raising resources.
In the medium term, ILRI expects to continue to grow, while balancing its expenditures against the revenues. The long-term stability ratio is well above the recommended range of 90-120 days. Other financial indicators show that the Centre should continue to remain fiscally healthy for the foreseeable future (see the table below).

	Current Ratio	*Working Capital (days)*	*Equity (days)*
2003 (actual)	1.8	147	133
2004 (estimated)	2.5	163	148
2005 (proposal)	3.3	166	152
2006 (plan)	3.8	171	158
2007 (plan)	4.0	176	162

Annex I. Project portfolio 2005-2007: Project descriptions and logical frameworks

- ILRI Institutional logframe
- Project 1: Targeting Opportunities
- Project 2: Enabling Innovation
- Project 3: Improving Market Opportunities
- Project 4: Biotechnology
- Project 5: People, Livestock and the Environment
- Project 6: System-wide Livestock Programme

International Livestock Research Institute (Institutional logframe)

Hierarchy of activities/objectives	*Indicators*	*Assumptions*	*Indicators for assumptions*
Goal Poverty, hunger and environmental degradation in developing countries are reduced through sustainable livestock production	Aggregate and specific poverty measures in target regions and systems improved	National development strategies and policies devote due attention to rural development and food security	National development strategies and polices adopted and implemented
Intermediate goal Assets of poor livestock keepers are secured Productivity of poor livestock keepers are sustainably improved Market opportunities for the poor are enhanced	Vulnerability and risks of poor livestock keepers reduced Livestock productivity and nutrition, health and incomes of poor farmers in target systems improved More efficient and sustainable use of land, water and labour for livestock production Market participation and success of poor farmers enhanced Safe, high quality and competitively priced livestock products for consumers		
Purposes Stakeholders (NARES, private sector and civil society organization) reduce poverty and hunger and conserve and enhance the environment through improvements to sustainable livestock production. Improve the performance of stakeholders through partnerships and alliances Improved policies fostering poverty reduction through sustainable livestock production implemented by national, regional and international decision makers	Relevance of research products (technologies, information, tools, methodologies, practices, and policy recommendations) from ILRI and its partners as judged by the number that are adopted and the extent to which they are implemented by stakeholders Value of stakeholders' institutional innovations and enhanced capacities as assessed by their support, relevance and impact Evidence of policy impacts and regulatory change	**Assumptions for achievement of intermediate goal** Livestock research and development outputs are fully integrated into agricultural and rural livelihood systems	Extent to which livestock development is linked to national and regional planning and development

Outputs[2]	*Through partnerships and alliances:*	*Assumptions for achievement of purpose*	
Tools, methods and information available for use by investors and partners to improve the prioritisation, targeting and delivery of interventions for pro-poor development in evolving agricultural systems (CG1-5)	International investors and national and regional partners refer to targeting tools and information in planning documents each year from 2004	Governments provide a policy, regulatory and funding environment that enables innovation and research impact	Assessment of the capacity of policy and regulations to enable institutional change and research innovations
Methods and capacities developed to enhance the effectiveness of public and private institutions and organizations in systems involving livestock. Innovative research partnership arrangements with key players including NARES, ARIs and the private sector (CG 1-5)	Effective platform for innovation processes established by ILRI and partners by 2006	Safety, security and lack of major disruptions and disasters in target countries and regions	Progress of research activities in different sites
Improved food-feed crops developed, evaluated and available to NARES and private sector partners for promotion, dissemination and delivery (CG1 and 3)	Dual-purpose food-feed crops assessed on-farm and proven varieties adopted in Africa and Asia	Support from international and other investors for agricultural and rural development research	Funding levels
Affordable technologies and methodologies (livestock nutrition, health and genetics) developed and available to NARES and private sector partners for promotion, delivery and dissemination (CG1 and 3)	Adoption and impact of strategies and technologies, including commercial products based on ILRI research, for disease control and improved nutrition		
Tools, methods and capacities developed and available to NARES for enhancing the conservation and utilisation of indigenous animal and forage genetic resources (CG2)	Increased use of indigenous breeds and forages for livestock production in at least 20 countries by 2010		
Management practices, technologies, policies and research methodologies developed and available to NARES and national, regional and international health and environmental agencies for enhancing human health and nutrition and the health and sustainability of ecosystems involving livestock (CG 3)	Methods and tools for natural resource assessment and management are accepted and used across sites and regions		
Policy-relevant tools, methods and recommendations developed and available to policy makers and regulators to enhance market access for poor producers and ensure food safety for consumers (CG4)	Adoption and use by policy makers and regulators of outputs for enhancing market access each year from 2004		
Policy-relevant information and communication products on global livestock issues available to public and private sector partners and the general public (CG4 and 5)	Key publications and communication products each year from 2004		
Increased knowledge and capacity of NARES and regional research organisations for livestock research and development (CG5)	Increased human and institutional capacity and impacts on livestock research and development in target regions		

[2] Refers to relevant CGIAR System output this output contributes to

Project 1. Targeting Research and Development Opportunities

Objective

This research area focuses on how investments in livestock research and development can have major impacts on poverty reduction and economic growth in ways that are socially equitable and ecologically sound. It addresses questions of where and by what means livestock can make a major contribution to alleviating poverty. Increased demand for livestock products in developing countries, coupled with land-use change, climate change, human population growth, globalisation, and more open trade in some areas is transforming the nature of livestock production and livestock ecosystems, and placing pressures on natural resources and coping strategies of the poor. This project examines those changes and models their driving forces, measures the consequences in terms of poverty, growth opportunities, social equity and the environment, and applies that knowledge to provide both strategic and applied targeting for research and development interventions. This understanding of livestock systems evolution, the role of livestock in sustainable poverty alleviation, and its consequences for both people and the environment, is translated with development partners into improved policy and technology options, investment priorities, livestock development strategies, and capacity strengthening.

Outputs

- Driving forces of livestock system evolution and alternative scenarios of livestock systems development identified, consequences determined, and results documented and made available to development partners
- Improved understanding of poverty processes, livelihood strategies and the role of livestock used in the design of poverty reduction programs, projects and policy
- Better information and knowledge made available to development partners on interventions and investment opportunities and their impacts on the livelihoods and assets of poor livestock keepers and the environment.

Gains (impact)

The outputs from this project will identify how investments in livestock research and development interventions can be increasingly targeted to ensure the greatest impact on poor people, in ways that are socially equitable and ecologically sound. The enhanced understanding of predicted opportunities, risks, and trade-offs will be used to develop appropriate strategies for livestock research and development. Targeting livestock research and development investments through targeted policy options, technologies, project design and appropriate project strategies will lead to better returns on investments in research and more efficient use of public investments and donor funds . Designing pro-poor interventions built on poverty diagnostics, understanding of expected economic, social, and environmental impacts will enhance the effectiveness of pro poor interventions that maximize poverty impacts. Building national and institutional capacity in partner organizations will improve the analytical rigor and country ownership that will help ensure that development inventions focus on poverty reduction and research outputs are utilized to have the greatest impact on poverty reduction.

Milestones

2005

- Global projections of livestock populations to 2015 completed and published
- A prototyping methodology and training manual for targeting systems and interventions according to farmers objectives developed
- A report on an analysis of livestock-mediated carbon sequestration options for case study sites in Ghana compiled and distributed
- A report on how smallholder production systems will intensify and evolve in Kenya due to population increases, changes in market access and other drivers completed and disseminated
- A workshop on alternative futures of livestock development and implications for livestock research held
- A policy workshop with policy makers and other stakeholders in Kenya held to present findings from LUCID project and discuss policy and program interventions
- A spatial and household database of livelihood assets and livelihood asset maps in Kajiado district, Kenya, compiled and published

- Uganda poverty mapping book published and used by the Government of Uganda
- Maps depicting pastoral risk management practices in Kajiado district developed and a pastoral risk management database compiled
- 3 policy briefs on the role of livestock in poverty alleviation completed and made available to Kenyan policy makers
- A report on methodologies for the analyses of poverty reduction and intervention mapping in agricultural systems compiled and distributed by 2005
- 20 Kenyan partners trained on pathways out of poverty methodology; 2 Ugandan researchers trained in poverty mapping methods and GIS
- An ex-post analysis on returns to dairying in Kenya completed, published, and distributed

2006

- A report on an analysis and synthesis of key feeding and crop management interventions for increasing food security, income and minimizing nutrients losses in crop/livestock systems developed for sites in Kenya, Tanzania, Ethiopia, Uganda, Nigeria, Zimbabwe, India and Sri Lanka compiled and distributed
- Spatial and household models for hot and cold spots of land use change in Kenya and consequences for poverty reduction and systems sustainability developed, compiled and disseminated
- *Ex-post* impact assessments of different land use interventions for smallholders farming in tsetse controlled areas completed
- A report on the linkages between changing land use, biodiversity, and land degradation in East Africa completed
- A policy workshop on how systems will evolve over the next 20 years and its implications on livestock systems development held in Kenya
- Estimates of the effects of changes in climate and their impacts on land use, technology choices and livelihoods assets in selected livestock-based systems completed and published
- An atlas of capital assets for Kajiado district developed and published
- 2 FAO PPLPI working papers published from the Peru and Kenya studies on pathways in an out of poverty and the role of livestock in poverty reduction
- 20 collaborators and government officers trained in use of livelihood asset database and Arc explorer
- A study on priorities for animal health research identifying the most important disease constraints of small livestock species of the poor in Africa completed and discussed with a range of development stakeholders
- A framework for evaluating the roles of food-feed crops in smallholder farming systems worldwide developed and made available to CG centres and partners
- Training for capacity building carried out using tools and methodologies for impact assessment for at least 30 people in partner institutions
- An environmental impact assessment of Tsetse control in East Africa completed

2007

- Scenarios of farming futures under climate change in east Africa developed and impact on livelihoods of poor people identified
- Results from causal analysis of spatial and non-spatial data to identify the main correlates of poverty, development interventions and the role of livestock in processes of poverty reduction completed and disseminated to policy makers and development partners
- A report on role of livestock in poverty alleviation, in Asia, Africa and Latin America completed and distributed to development partners
- A study on priorities for animal health research to identify the most important disease constraints of small livestock species of the poor in Africa completed and discussed with a range of development stakeholders

Users: Farmers, NGO's and NARS, community and national policy makers and researchers, decision makers in donor agencies, international and national research and development organisations including ILRI, and other stakeholders

Collaborators

NARS Partners: UCL, *Belgium*; Centro de Investigacion Agricola Tropical, Ministry of Agriculture, *Bolivia;* University of Yaounde, *Cameroon*; TSBF–CIAT, *Columbia*; Debub University, *Ethiopia*; EARO, FFEM, *France*; DLS, *Gambia*; University of Hohenheim, *Germany*; SARI, SRI, University of Ghana, *Ghana*; Department National d'Elevage, *Guinea*; JICA, Japan; University of Florence, *Italy*; CBS, KARI, KWS, Kenyatta University, KIPPRA, Ministry of Planning, *Kenya*; DARTS, *Malawi*; Direction Nationale de l'Appui Monde Rural, Institute d'Economie Rurale du Mali, *Mali*; Wageninnigen University, Netherlands; L'institut de recherché agronomique, *Niger*; Institut Senegalise de Recherche Agricoles, *Senegal*; DRD, Lake Zone Agricultural Research & Development Institute, NBS, *Tanzania*; Agricultural Research Institute, NARO, Uganda Bureau of Statistics, *Uganda*; University of Edingburgh, *United Kingdom*; ICASA, Michigan State University, University of Florida, University of Princeton, World Resources Institute, *United States of America*; Department of Research & Specialised Services, Zambia; University of Zimbabwe, *Zimbabwe.*

ARI partners: CSIRO, *Australia*; EU, *Belgium*, CIRAD, *France;*; FAO, *Italy;* Dutch Government, *Netherlands*; AsDB, *The Philippines*; DFID, *United Kingdom*, NSF, USAID, Rockefeller Foundation, *United States of America.*

CGIAR and Intergovernmental partners: CIAT, CIMMYT, ICRISAT, ICRAF, IFPRI, IITA, IMWI.

Regional and ecoregional partners: ASARECA, SADC, EARO, FARA, AU/IBAR, CORAF.

Cost—US$ 2.6million in 2005 increasing to $ 2.8million by 2007

System linkages—Sustainable production, Policy, and Enhancing NARS

Project 1:Targeting Research and Development Opportunities

Hierarchy of activities/objectives	*Indicators for achievements*	*Assumptions*	*Indicators for Assumptions*
Goal To reduce poverty by improving human health and enhancing sustainable management of natural resource assets through livestock-based interventions	Aggregate and specific poverty measures in livestock target regions and systems improved	National development strategies and policies devote due attention to rural development and food security	National development strategies and polices adopted and implemented
Intermediate goal Better targeted pro-poor policies and practices developed based on accurate forecasts of changes in livestock and associated systems, impact assessment studies and better understanding of links between livestock and poverty	Forecasts of livestock related trends, impact assessment studies and poverty analyses made widely available and used by policy makers	*Assumptions for achievement of overall goal* Appropriate national and international institutions accept and use the research recommendations	National and international strategy and policy documents. Evidence of adoption of recommendations.
Purpose *Intended purpose:* Improved research prioritisation *Actor:* National, regional and international research organisations and donors *Output utilised:* Results of impact analyses *Innovative behaviour:* Research managers and donors set livestock-based research priorities based on impact assessment analyses *Intended purpose:* Improved pro-poor policies and strategies *Actor:* Policy makers in agriculture, land use and environment *Output utilised:* Forecast of future trends in livestock and associated systems and poverty analyses *Innovative behaviour:* Policy makers utilise forecasts and analyses to develop better pro-poor livestock policies and strategies *Intended purpose:* Better targeted and designed pro-poor livestock based interventions *Actor:* Development agencies and governments *Output utilised:* Results from poverty analysis and assessments of pro-poor interventions *Innovative behaviour:* Development professionals utilise results from poverty analyses and pro-poor interventions to develop better livestock–based projects	Results of impact analysis used by ILRI and its partners as well as donors to set research priorities and draw lessons for initiating new research activities Results from technology foresight and poverty analysis cited in policy and strategy documents Results from poverty analysis and assessments of pro-poor interventions used in design of development partner projects	Assumptions for achievement of intermediate goal Policy makers, development partners, donors and research managers able and willing to utilise project outputs Role of livestock in poverty alleviation appreciated by policy makers, development partners and donors	Evidence that policy makers, development partners, donors and research managers utilise outputs from Targeting Opportunities project

Hierarchy of activities/objectives	*Indicators for achievements*	*Assumptions*	*Indicators for Assumptions*
Outputs *1.1* Driving forces of livestock system evolution and alternative scenarios of livestock systems development identified, consequences determined, results documented and made available to development partners	The assessment of future scenarios of livestock completed Options for changes in future livestock practices available and disseminated to development partners Results of scenario analysis and predictive studies influence policy decision or strategy of at least 2 development partners Trajectories of livestock system changes analysed and used for decision making Options for land use change analysis and role of livestock completed	Assumptions for achievement of purpose Policy makers, development partners, donors and research managers able and willing to utilise project outputs	Outputs cited by policy makers, donors and research managers in planning documents Role of livestock in poverty alleviation acknowledged in documents produced by policy makers, donors and research managers
1.2 Improved understanding of poverty processes, livelihood strategies and the role of livestock in poverty reduction used in design of poverty interventions	Poverty maps for Kenya and Uganda published Results from role of contribution of livestock to poverty reduction used in project and policy design by at least 2 major donors Results from role of contribution of livestock to poverty reduction used in revision of PRSP or national investment framework	Policy makers, development partners, donors and research managers able and willing to utilise project outputs	Outputs cited by policymakers, donors and research managers in strategic decision-making and policy formulations
1.3 Better information and knowledge made available to development partners on interventions and investment opportunities and their impacts on the livelihoods and assets of poor livestock keepers and the environment	Framework for impact assessment used by SLP and 2 CGIAR centres to allocate feed resources Results from targeting used in targeting interventions by at least 3 sub-regional organisations	Policy makers, development partners, donors and research managers able and willing to utilise project outputs	Outputs cited by policymakers, donors and research managers in strategic decision-making and policy formulations Institutional frameworks to facilitate adoption of recommendations are available

Activities	*Milestones*	*Preconditions for implementation of activities*	*Indicators*
Output 1.1 *Document and disseminate analyses of current data related to livestock systems, land use and climate*	*Document and disseminate analyses of current data* Spatial and household models for hot and cold spots of land use change in Kenya and consequences for poverty reduction and systems sustainability developed, compiled and disseminated by 2006	Appropriate institutions for collaboration are identified	Project documents Databases and maps
Document and disseminate predictions of future changes in livestock systems, land use and climate	*Document and disseminate predictions of future changes* Global projections of livestock populations to 2015 completed and published by 2005 A report on how smallholder production systems will intensify and evolve in Kenya due to population increases, changes in market access and other drivers completed and disseminated by 2005 A report on the linkages between changing land use, biodiversity, and land degradation in East Africa completed by 2006 A policy workshop with policy makers and other stakeholders in Kenya held to present findings from LUCID project and discuss policy and program interventions by 2005 A policy workshop on how systems will evolve over the next 20 years and its implications on livestock systems development held in Kenya by 2006 Estimates of the effects of changes in climate and their impacts on land use, technology choices and livelihoods assets in selected livestock-based systems completed and published by 2006 Scenarios of farming futures under climate change in east Africa developed and impact on livelihoods of poor people identified by 2007.	Data availability and access is granted by partners and associated institutions Adequate channels for disseminating project results are identified Policymakers consider land use and systems evolution as integral part of the information required to enable better policies	Exposure of project-generated information in selected dissemination channels Project reports
Output 1.2 *Compile and publish data relating to spatial distribution of poverty*	*Spatial distribution of poverty* Spatial and household database of livelihood asset maps in Kajiado district, Kenya, compiled and published by 2005 Uganda poverty mapping book published and used by Government of Uganda by 2005 Maps depicting pastoral risk management practices in Kajiado District, Kenya developed and pastoral risk management database compiled by 2005 An atlas of capital assets for Kajiado district, Kenya, developed and	Data availability and access is granted by partners and associated institutions	Project reports, maps and databases disseminated to partners Project reports

Activities	*Milestones*	*Preconditions for implementation of activities*	*Indicators*
	published by 2006 Results from causal analysis of spatial and non-spatial data to identify the main correlates of poverty, development interventions and the role of livestock in processes of poverty reduction completed and disseminated to policy makers and development partners by 2007		Policy briefs disseminated
Execute case studies on livestock/poverty interactions	*Execute case studies* 2 FAO PPLPI working papers published from the Peru and Kenya studies on pathways in an out of poverty and the role of livestock in poverty reduction by 2006		
Develop policy briefs and background papers on role of livestock in poverty alleviation	*Develop policy briefs and papers* 3 policy briefs on livestock role in poverty alleviation completed and made available to policy makers by 2005 Report on role of livestock in poverty alleviation, in Asia, Africa and Latin America completed and published by 2007		
Strengthen capacity of development partners on aspects of poverty analysis and mapping	*Strengthen capacity of development partners* 20 Kenyan partners trained on pathways out of poverty methodology by 2005 2 Ugandan researchers trained in poverty mapping methods and GIS by 2005 20 collaborators and government officers trained in use of livelihood asset database and Arc explorer by 2006		Number of trained personnel using methodologies developed
Output 1.3 *Document and distribute information on better targeting and prioritisation of livestock related interventions and research*	*Document and distribute information on better targeting and prioritisation* A report on methodologies for the analyses of poverty reduction and intervention mapping in agricultural systems compiled and distributed by 2005	Sufficient data exist to carry out the targeting analyses	Databases made available
	A study on priorities for animal health research to identify the most important disease constraints of small livestock species of the poor in Africa completed and discussed with a range of development stakeholders in 2007	Support exists by project partners and policy makers to develop targeting framework	Databases, tools and documents available
Execute case studies on livestock mediated interventions	*Case studies* A report on an analysis of livestock-mediated carbon sequestration options for case study sites in Ghana compiled and distributed by 2005	Data availability and access is granted by partners and associated institutions	Project documents

Activities	*Milestones*	*Preconditions for implementation of activities*	*Indicators*
	A report on analysis and synthesis of key feeding and crop management interventions for increasing food security, income and minimizing nutrients losses in crop/livestock systems developed for sites in Kenya, Tanzania, Ethiopia, Uganda, Nigeria, Zimbabwe, India and Sri Lanka compiled and distributed by 2006	Data from case studies is available and shared by project partners	
Execute livestock related impact assessment studies	*Impact assessment studies* *Ex-post* impact assessments of land use options for smallholders farming in tsetse controlled areas completed by 2006 An ex-post analysis on returns to dairying in Kenya completed by 2005 An environmental impact assessment of Tsetse control in East Africa completed by 2006	Suitable partners willing to collaborate and share information on *ex post* assessment	Project documents
Develop tools including priority setting frameworks	*Develop tools* A framework for evaluating the roles of food-feed crops in smallholder farming systems worldwide developed and made available to CG centres and partners by 2006 A study on priorities for animal health research identifying the most important disease constraints of small livestock species of the poor in Africa completed and discussed with a range of development stakeholders by 2006	Support exists by project partners and policy makers to develop the targeting framework	Partners willing to implement framework in their workplans
Strengthen capacity of development partners in better targeting of systems and interventions	*Strengthen capacity* A prototyping methodology and training manual for targeting systems and interventions according to farmers objectives developed by 2005 Training for capacity building carried out using tools and methodologies for impact assessment for at least 30 people in partner institutions by 2006	Proven demand exists for impact assessment capacity building	Number of trained personnel using methodologies developed

Project 2: Enabling Innovation

Objective

Although systematic approaches for generating and disseminating technologies from research through extension have worked well for certain clients and in certain settings, the traditional linear paradigm has often failed to address the needs or have significant impact among the poor. This has been attributed in part to a failure to fully engage poor livestock keepers and other stakeholders in such processes, and to understand their circumstances and realities, thus failing to create an environment that would facilitate the identification, adaptation and dissemination of promising technological and institutional innovations. For this reason, under ILRI's new strategy, priority is being given to efforts to gain a clear understanding of the mechanisms that make research more effective and efficient, knowledge more contagious, processes more inclusive and outcomes more in favour of livestock-dependent poor people. Consequently, the *Enabling Innovation* Theme focuses on the development and testing of approaches and partnerships that (i) enable the identification of agreed, prioritised, researchable constraints that affect livestock-dependent poor people under the three ILRI-identified development pathways, (ii) ensure the implementation of research in a manner which effectively and efficiently addresses those constraints, and (iii) guarantee the use of media and pathways to facilitate knowledge flows amongst all stakeholders that enable pro-poor outcomes.

Outputs

- Mechanisms that facilitate suitable technology, information and knowledge exchange, identified and strengthened or developed and validated
- Enhanced capacity within ILRI and its partners to 'learn by doing'
- Policy and/or institutional changes, tailored to specific circumstances, that facilitate public and private development partners to scale innovations up and out
- Methodologies, approaches and partnerships established to identify research needs, conduct appropriate research (including M&E), ensure uptake of research results and fund research
- Roles of partners in the different stages of the innovation process identified and evaluated.

Milestones

2005

- Strengthening of knowledge exchange mechanisms for pro-poor livestock research and development: mainstreaming of 'institutional learning and change' processes by network partners and analysis of partnership mechanisms completed
- Identification and development of indicators/inducers of livestock innovation available for field testing
- Processes for innovation and introduction of new technologies, ideas and extension approaches within the innovative communities in Vietnam and The Philippines enhanced and implemented
- Methodologies and tools for the analysis of innovation systems and partnerships identified or developed for testing
- 'Communities of practice' in participatory livestock research developed and providing enhanced learning, developing appropriate livestock technologies, creating training capacity, and scaling out innovations
- Tsetse repellent-base control strategies for pastoralists evaluated in farmer-managed trials
- Development and evaluation of options for improved management of trypanocide resistance in West Africa: farmer trials and marketing strategies completed and distributed
- Public-private partnership for the commercial distribution of ECF immunisation initiated
- Partnerships established to facilitate the scaling-up and out of FFS established in Uganda, Tanzania, Kenya, Pakistan and SE Asia.

2006

- Gaps and opportunities identified in at least 2 livestock-knowledge exchange mechanisms for the rural poor

- Options that maximise the contribution that fodder makes to livestock-dependent poor people tested and adopted in West Africa and India
- Options for crop-livestock systems of livestock-dependent poor people in West Africa tested and adopted using participatory approaches and scaling-up and out strategies formulated.

2007

- Strengthening of knowledge exchange mechanisms for pro-poor livestock research and development: partnership mechanisms strengthened
- Partnerships identified and strategies and technologies developed for sustainable partnerships for community based livestock research in the 'resource to consumption' programme in Uganda and Malawi
- Methods for mainstreaming participatory research and gender analysis, capacity building and impact assessment at various institutions tested and used in the Nile river and Yellow river basins
- Develop and test innovative participatory methods for the delivery of NCD vaccine in West Africa
- Develop and test innovative system, including public and private partnerships, for delivery of livestock services to smallholder dairy sector in West Africa.

Users—Farmers, development agents, NARS, ARIs, policy makers and researchers

Collaborators

NARS Partners: Belgian Survival Fund, Veterinaires sans Frontieres , *Belgium*; CIRDES, Direction Provinciale des Ressources Animales, INPHB, Programme National de la Gestión de la Terroir, Service de Lutte contre la Trypanosomiase Anímale et les Vecteurs, *Burkina Faso*; CAAS, *China*; Houphouet Boigny, Institut Nacional Polytechnique, Service de Lutte contre la Trypanosomiase Animale et les Vecteurs, *Cote d'Ivoire*; Danida APS, Scanagri, *Denmark;* Agri-Systems, Etiopía; ITC, PROFIEET, *Gambia*; Freie Universitat Berlin, University of Hannover, *Germany*; Institut de Recherche Agronomique, *Guinea*; Department of Veterinary Services, KARI, *Kenya*; Centre Regional de la Recherche Agricole Sikasso, Institut d'Economie Rurale, Laboratoire Central Veterinaire, Unite Centrale de lutte Contre les Mouches tse-tse et les Trypanosomoses Animales, *Mali*; PROLINNOVA, UN-INTECH, Wageningen University, *Netherlands*; Ahmadu Bello University, Department of Livestock and Pest Control Services, Federal Ministry of Agriculture and Rural Development Metti Allah, NVRI, PACE, University of Ibadan, University of Maiduguri, University of Nigeria,Vom Plateau State Associations, National Livestock Projects Division, Smallholder Livestock, University of Agriculture, Veterinary Services Department, *Nigeria*; CARE. Consortium for Sustainable Development of the Andean Ecoregion, *Peru;* ASB, Bureau of Agricultural Research, *The Philippines*; ITTBDCP, Ministry of Water and Livestock Development, Sokoine University of Agriculture, Veterinary Investigation Centre, *Tanzania* Animal Industry and Fisheries, LIRI, Ministry of Agriculture, Makerere University, Ministry of Agriculture, *Uganda*; University College London, University of Warwick, Wrenmedia, *United Kingdom*; Land O'Lakes, *United States of America.*

ARI partners: CIRDES, *Burkina Faso*; CAAS, *China*; ICIPE, *Kenya;* PCARRD, *Philippines*; NRI, *United Kingdom.*

International organisations
BMZ, *Germany*; FAO, IFAD, *Italy;* DFID, *United Kingdom*, World Bank, Rockefeller Foundation, USAID, *United States of America.*

Regional and ecoregional partners: AU, *Ethiopía*, ITC, *Gambia*.

CGIAR and Intergovernmental partners: CIAT, CIP, ICARDA.

Cost— US$ 5.3 million in 2005 increasing to US$ 5.7 million by 2007.

System linkages—Sustainable Production, Policy and Enhancing NARS.

Project 2: Enabling Innovation

Hierarchy of activities/objectives	*Indicators for achievements*	*Assumptions*	*Indicators for assumptions*
Goal Poverty, hunger and environmental degradation in developing countries are reduced through sustainable livestock production	Aggregate and specific poverty measures in livestock target regions and systems improved	National development strategies and policies devote due attention to rural development and food security	National development strategies and polices adopted and implemented
Intermediate goal Innovation systems for livestock related pro-poor information, technologies and approaches enhanced	At least 5 new or adapted options for improved livestock health and productivity being used in 5 countries by 2014	*Assumptions for achievement of overall goal* Appropriate policy and institutional framework and environment for innovations	Policy documents, institutional capacities and agreements
Purpose *Intended response*: Capacity strengthened for innovation and knowledge systems research, monitoring and evaluation *Actor*: national, regional and international research organisations *Output utilised*: Project 2 research results *Innovative behaviour*: Innovation systems approaches mainstreamed into agendas of research and development partners *Intended response*: Scaling-up and out of proven innovations *Actor*: Public and private sector *Output utilised*: Project 2 research results *Innovative behaviour*: Broad range of public, private and tertiary sector actors utilise research results to inform selection of innovations and pathways for scaling-up and out	NARS, regional research organisations and ILRI adopt participatory approaches in research agendas Approaches and partnerships that make livestock-sector related research more effective and efficient, knowledge more contagious, processes more inclusive and outcomes more in favour of poor people are actively and effectively used by ILRI and its partners. At least 5 innovations scaled-up and out by 2009.	**Assumptions for achievement of intermediate goal** Other ILRI Projects and ILRI partners deliver on their purpose in timely fashion Partner support and client demand for candidate methodological, technical, institutional and policy options is sustained Sudden changes in the global environment do not prevent candidate methodological, technical, institutional and policy options generate expected benefits and impact	Variety of media detailing achievements of ILRI themes and ILRI partners Exposure, adoption and utilisation rates Impact assessments
Outputs *2.1* Mechanisms that facilitate suitable technology, information and knowledge exchange, identified and strengthened or developed and validated *2.2* Enhanced capacity within ILRI and its partners to 'learn by doing' *2.3* Policy and/or institutional changes, tailored to specific circumstances, that facilitate public and private development partners to scale innovations up and out *2.4* Methodologies, approaches and partnerships established to identify research needs, conduct appropriate research (including M&E), ensure uptake of research results and fund research *2.5* Roles of partners in the different stages of the innovation process identified and evaluated	Mechanisms documented and used Institutional and organizational changes that empower partnerships and enhance interactions among actors along the innovation process adopted ILRI and its partners have mainstreamed a process of reflection, reframing and use of lessons learned during the research process that results in documented changes in behaviour, performance assessment and in increased impact	Knowledge and innovation systems that make research more effective and efficient, knowledge more contagious, processes more inclusive and outcomes more in favour of livestock-dependent poor people Candidate methodological, technical, institutional and policy options are appropriate for evaluation and dissemination	Publications, datasets, conference proceedings and reports Participatory evaluations confirm suitability of options

Activities	*Milestones*	*Preconditions for implementation of activities*	*Indicators*
All outputs (2.1-2.5) *Identify and develop indicators of successful livestock innovation* *Execute case studies relating to innovation systems* *Promote use of knowledge management systems to enhance innovation systems* *Develop and test approaches and tools to analyse and promote uptake of innovation* *Strengthen capacity and promote institutional change related to innovation systems*	*Identify and develop indicators* Identification and development of indicators/inducers of livestock innovation available for field testing by 2005 *Execute case studies* Four pilot sites for innovation system research pilot sites established in Ethiopia operational at the start of 2005 *Promote use of knowledge management systems* Strengthening of knowledge exchange mechanisms for pro-poor livestock research and development: mainstreaming of 'institutional learning and change' processes by network partners and analysis of partnership mechanisms completed by 2005; partnership mechanisms strengthened by 2007 Gaps and opportunities identified in at least 2 livestock-knowledge exchange mechanisms for the rural poor by end 2006 *Develop and test approaches and tools to analyse and promote uptake of innovation* Processes for innovation and introduction of new technologies, ideas and extension approaches within the innovative communities in Vietnam and The Philippines enhanced and implemented by mid-2005 Methodologies and tools for the analysis of innovation systems and partnerships identified or developed for testing by 2005 'Communities of practice' in participatory livestock research developed and providing enhanced learning, developing appropriate livestock technologies, creating training capacity, and scaling out innovations by end 2005 Partnerships identified and strategies and technologies developed for sustainable partnerships for community based livestock research in the 'resource to consumption' programme in Uganda and Malawi by end 2007 Methods for mainstreaming participatory research and gender analysis, capacity building and impact assessment at various institutions tested and used in the Nile river and Yellow river basins, by 2007 *Strengthen capacity and institutional change* Curriculum for a training workshop on communicating livestock science to policy makers developed and tested in a pilot workshop by end 2004 and used in 2 full workshops in Africa and Asia by end 2005	ILRI and its partners are interested in and have the resources required to obtain an improved understanding of innovation systems Innovation systems paradigm accepted by ILRI management, scientist and partners ILRI and partners develop critical capacity to support research on livestock innovation systems	Changes in expertise among staff at ILRI and partner organizations Funding support to Theme activities and number of partnerships established

Evaluate and test options that facilitate improved livestock health and productivity *Develop and test innovative delivery systems*	*Evaluate and test options* Tsetse repellent-base control strategies for pastoralists evaluated in farmer-managed trials by 2005 Development and evaluation of options for improved management of trypanocide resistance in West Africa: policy study in Mali completed and disseminated and farmer trials and marketing strategies completed and distributed by end 2005 Options that maximise the contribution that fodder makes to livestock-dependent poor people tested and adopted in West Africa and India by 2006 Options for crop-livestock systems of livestock-dependent poor people in West Africa tested and adopted using participatory approaches and scaling-up and out strategies formulated by end 2006 *Develop and test delivery systems* Public-private partnership for the commercialisation of East Coast fever immunisation established and commercial distribution of ECF immunisation initiated by 2005 Partnerships established to facilitate the scaling-up and out of FFS established in Uganda, Tanzania, Kenya, Pakistan and SE Asia by 2005 Develop and test innovative participatory methods for the delivery of NCD vaccine in West Africa by 2007 Develop and test innovative system, including public and private partnerships, for delivery of livestock services to smallholder dairy sector in West Africa by end 2007		

Project 3. Improving Market Opportunities

Objective

Marketing of livestock and their products has long been an essential pathway for income generation and livelihoods for the poor. Research has shown consistently that even the poorest can gainfully participate in livestock markets. Rapidly growing livestock markets in the developing world provide real opportunities but also significant threats to participation of the poor, due to structural changes associated with globalization, the increasing concentration of population and production around cities, and a changing regulatory environment. To counter these threats by bringing together their policy and technical capacities from macro to micro level, ILRI and IFPRI have developed a joint program to improve the market success of poor livestock keepers. This program has 3 project areas of focus. Each institute will contribute in its area of expertise, achieving synergies across disciplines and research approaches, while avoiding overlaps.

- *Smallholder competitiveness in changing markets*: Although both IFPRI and ILRI research has demonstrated that smallholders can be more efficient in generating profits per unit output than that large-scale operators in many livestock production activities, it has also demonstrated major differences across farms. There is considerable scope for helping poor and disadvantaged persons who might otherwise be left behind to join a market-driven pathway to improving their livelihoods through livestock. A mix of technical, institutional, and policy options are tested and adapted to increase the ability of smallholder and disadvantaged livestock producers to remain commercially-viable in the face of changing market requirements and increased competition from imports. The initial focus of this work has been in smallholder dairy systems of Africa and Asia. Increasing emphasis will be given to smallholder poultry and pig enterprises in Asia and Africa.
- *Changing demand and market institutions:* In response to concentrating and rising consumer demand for livestock products in many parts of the developing world, market chains are becoming more concentrated and difficult for independent small-scale operators to function in. In part chains are becoming longer, in part individual operators are becoming larger-scale, and in part consumers are becoming more demanding in terms of quality and food safety. This project focuses on identification of the driving forces affecting the accessibility of market channels by the poor and disadvantaged, and on institutional innovations, technical interventions, and other opportunities for helping them respond to new market requirements. This research is also targeted to helping poor consumers in urban centers benefit from safer livestock and milk products that might otherwise become too expensive to access in more formal retail channels.
- *Diseases of trade and markets:* Major global procedures and patterns for control of animal disease on a world-wide scale set up in the 1950s and 1960s are under challenge from structural changes in the distribution of livestock production and consumption, globalization, changes in technological options for disease control, and changes in public acceptance in the industrialized countries of traditional approaches to disease control involving mass slaughters in the event of disease outbreaks. Changing opportunities for export to high-value markets from developing countries are currently leading to disease control strategies that exclude the poor and small-scale sector from livestock production altogether. Several of the many options being discussed for changing methods of control of trade-relevant diseases such as FMD could lead to a major re-alignment of trade in meat across countries. Especially promising are new frontiers for vaccine development that overcome old constraints in developing countries, and new technologies for providing better traceability of products. This project will associate risk analysis from the perspective of veterinary epidemiology with economic research on trade implications of different options for disease control and research on the distributional impact within developing countries of different paths.

Outputs

- Technical, institutional and policy options identified that increase the ability of smallholder and disadvantaged livestock producers to expand commercially-viable livestock enterprises;
- Technical, organizational, and policy options identified for improved market institutions and servicing of small-scale, poor and disadvantaged producers and consumers, in the context of rising demand for reliable quality, food safety, and increased openness to trade;
- Impact on market channels and prices of changing methods and regulations of animal disease control assessed and options identified for countries, small-scale and poor producers to comply with

changing animal disease control measures at the national and international levels;
- Capacity built among national collaborators and collaborating institutions for assessment of technical, institutional, and policy options to increase the market access of poor, small-scale and disadvantaged livestock producers and consumers.

Gains (impact)

This project will contribute to increased productivity and improved livelihoods for smallholder farmers and market agents, especially poorer and more vulnerable groups, through increased access to input and output markets for livestock products, and appropriate technology adoption on farms and in small-scale livestock markets. Consumers will benefit from lower or stabilized prices, and better quality livestock products.

Milestones

2005

- Causes and consequences of scaling-up of individual livestock production operations and assessment of options for improving the impact on smallholders identified and documented in a comparative study of selected fast-growing developing countries
- Assessment of technical options and trends affecting institutional barriers to increased small farm sales of small ruminants in Near East-North Africa
- Best practices for smallholder inclusion in dairy markets identified and documented from a comparative series of case studies in East Africa and South Asia
- Technical and policy options assessed for improving the efficiency and food safety performance of small scale agents in East African urban markets, in the context of small-scale producers
- The potential impact of changes in OECD country animal health and food safety regulations on developing country exports of livestock products, and associated impacts on poor and small-scale producers assessed
- Policy options assessed for decreasing the transfer costs of livestock produced and marketed by poor people and small-scale operators in the Central Sahel and destined for the Central Coast of West Africa

2006

- Constraints to smallholder participation in pig, live poultry, and egg markets assessed and documented in Southeast Asia
- Pros and cons of contract farming for livestock in South and SE Asia assessed and documented and policy domains for further research identified
- Characterization and analysis of small ruminant health delivery systems and market access in the near east—North Africa
- The profitability of farm-level investments in forage technology and net farm income at different levels of scale in Central America estimated
- Policy recommendations formulated and disseminated of the options for using contract farming of livestock to promote increased smallholder productivity and participation in livestock product markets in South and Southeast Asia

2007

- Key trends in changing demand attributes for livestock products in a sample of developing countries with different geographical, demographic, and economic characteristics identified and documented
- Identification and pilot testing of improved animal health, feeding, breeding, finance and credit, market levies and service strategies, both technical and organizational, to improve delivery of services and market access to poor farmers in selected countries of Near East--North Africa
- Policy options for alleviating constraints to smallholder participation in growing beef and milk markets in Central America identified and documented
- Policy options identified and documented for regulatory and institutional change in developing countries that will help meet both external and internal food safety and animal health concerns, while minimizing negative impacts on small-scale producers

Users—Policy makers, planners, and policy researchers, livestock market development and technology agencies in the developing countries, NGOs and donor agencies

Collaborators

NARS partners: Bangabandhu Sheikh Mujibur Rahman Agricultural University, Department of Livestock Services, *Bangladesh;* PSB/GTZ, University of Ouagadougou, *Burkina Faso;* CEPEA, University of Sao Paolo, *Brazil;* Consejo Agropecuario Centroamericano, Instituto Interamericano de Cooperación para la Agricultura, *Costa Rica*; DIAS, *Denmark*; Addis Ababa University, EARO, and Mekelle University, *Ethiopia*; ARI and UST, *Ghana;* Asociación Gualtemateca de Criadores de Ganado Brahmán y Derivados, Ganadería y Alimen, Ministerio de Agricultura, tación, *Guatemala*; Federación Nacional de Agricultores y Ganaderos de Honduras, Secretaria de Agricultura y Ganadería, *Honduras*; IIM-Ahmedabad, NCAP, NDDB, Sardar Patel Institute, *India;* FASID, *Japan;* Greentowns, CIAT-TSBF, KARI, Kenya Diary Board (KDB), Action Aid, ITDG, Tegemeo (Egerton Univesity), the Jordanian Ministry of Agricultura, MoLFD, Ministry of Agriculture and Rural Development, *Kenya*; Federación de Asociaciones Ganaderas de Nicaragua, Ministerio Agropecuario y Florestal, *Nicaragua*; Pakistani NARS, *Pakistan*; University of the Philippines Los Banos, Central Luzon State University, PCARRD, *Philippines*; the Sudanese Ministry of Animal Resources; *Sudan*; The Syrian Ministry of Agriculture and Agrarian Reform, *Syria*; Sokoine University of Agriculture, *Tanzania*; Thai Development Research Institute, *Thailand*; the Tunisian Ministry of Agriculture, *Tunisia*; NARO, Makerere University, Environment and Water Resources, *Uganda*. University of Reading, *United Kingdom*

ARI partners: : IDRC, *Canada*; DANIDA, *Denmark*; CIRAD-EMVT, *France* BMZ, *Germany*; FAO, IFAD, *Italy*; CFC, Wageningen Agricultural University, *Netherlands*; DFID, Institute for Development Studies, *United Kingdom;* Purdue University, *USA*

CGIAR and Intergovernmental partners: CIAT, CIP, ICARDA ICRAF, IFPRI, FAO/AGA and World Bank

Regional and ecoregional partners: ASARECA, CILSS, Inter-American Institute for Agriculture Sciences (IICA)

NGOs and private sector partners: CALPI (*India)*, Crawford Fund *(Australia),* Heifer Project International *(USA),* Land O'Lakes (*USA*); SIDE *(Costa Rica)*; SITE *(Kenya*); AGIP Oil , *Nigeria*

Cost—US$ 4.2 million in 2005, increasing to US$ 4.5 million by 2007

System linkages

Sustainable Production, Policy, Enhancing NARS

Project 3: Improving Market Opportunities

Hierarchy of activities/objectives	*Indicators*	*Assumptions*	*Indicators for assumptions*
Goal To reduce poverty, hunger and environmental degradation and improve human health in developing countries through sustainable livestock production	Aggregate and specific poverty measures in livestock target regions and systems improved	National development strategies and policies devote due attention to rural development and food security	National development strategies and polices adopted and implemented
Intermediate Goals Poor livestock keepers have improved livelihoods through better access to and success in livestock markets Poor consumers have better supplies of high quality, safe and competitively priced livestock products	Aggregate and specific measures of poverty and market participation indicators in target livestock systems Aggregate and specific measures of poverty and livestock consumption indicators in target groups	*Assumptions for achievement of overall goal* Appropriate national and regional institutions put in place and support appropriate policy and regulatory framework	Policy and regulatory documents Evidence of implementation
Purpose *Intended response:* Increased participation by the poor and disadvantaged in more remunerative and safe livestock input and product markets (both as producers and consumers) *Actors:* Policymakers and policy advisors engaged in regulation or other activities directly impacting the production, marketing, processing, retailing and international trade of livestock and livestock products; private sector, civil society, and producer organizations supplying inputs to or procuring outputs from small-scale/poor/disadvantaged livestock producers; non-livestock agents interested in promoting improved livelihoods and nutrition of poor and disadvantaged persons through sustainable market-oriented processes. *Output utilised:* 3.1, 3.2, 3.3 and 3.4 *Innovative behaviour:* Pro-poor policy, institutional and technology options developed and implemented, informed by results of case studies and identification of best practices	Increased awareness of, and resources devoted to, pro-poor livestock market policies and development among policy-makers and development agencies Documented exposure of policymakers and their advisors in developing countries to research results indicating options for increasing the participation of small-scale operators in livestock product markets Alternative technical options for markets serving small-scale producers adopted	*Assumptions for achievement of intermediate goal* Institutional frameworks to facilitate adoption of policy recommendations are available Policymakers, civil society leaders and private sector decision-makers are both willing and able to act to implement recommendations for increased participation by small-scale producers in high-value markets Benefits from increased vertical coordination of livestock product supply chains are in part passed on to farmers	Evidence of pro-poor decisions made and implemented in line with recommendations The farm-gate share of livestock commodity wholesale prices grows over time for poor and disadvantaged farmers

Outputs	**Indicators**	**Assumptions for achievement of purpose**	*Indicators for assumptions*
3.1 Technical, institutional and policy options identified that increase the ability of smallholder and disadvantaged livestock producers to expand commercially-viable livestock enterprises	Increased awareness of--and resources devoted to--smallholder competitiveness and pro-poor livestock market policies among policy-makers and development agencies Evidence demonstrating options for increasing the competitiveness of smallholder livestock producer enterprises Evidence indicating options for providing higher and more reliable returns to small-scale and disadvantaged market agents in livestock input and product markets	Smallholders receive lower prices and face greater barriers to market participation than do large scale producers. Institutions of collective action such as coops and contract farming can reduce barriers to increased market participation by smallholders.	Evidence that smallholders in urban markets are paid lower prices for seemingly comparable commodities, compared to large-scale producers and contract farmers at all scales Evidence that livestock enterprises of smallholder and female participants in contract farming and coop schemes are more viable than those of independent small-scale and female farmers
3.2 Technical, organizational, and policy options identified for improved market institutions and servicing of small-scale, poor and disadvantaged producers and consumers, in the context of rising demand for reliable quality, food safety, and increased openness to trade.	Increased awareness of market factors influencing smallholder sales to developing urban market channels among policy-makers and development agencies Evidence demonstrating technical, institutional, and policy options for increasing the amount of smallholder livestock product sales to urban outlets Evidence demonstrating options for enabling small-scale/disadvantaged livestock producers and marketing agents to meet public and private sector food safety and quality regulations in a manner recognized by the market.	Urban livestock markets are growing, as is demand for food safety and reliable quality Retail chains will play a larger role in markets, and seek to capture changing urban demand by limiting the risk of food-borne disease through the products they sell Support exists among policy makers for alternative approaches to meeting standards in food safety and quality	Study results that demonstrate that urban consumers in developing countries are increasingly willing to pay a premium for food safety and reliable quality. Study results that demonstrate that procurement patterns of urban retail markets are changing away from buying from independent smallholder producers
3.3 Impact on market channels and prices of changing methods and regulations of animal disease control assessed and options identified for countries, small-scale and poor producers to comply with changing animal disease control measures at the national and international levels	Increased awareness of factors influencing smallholder capacity to comply with SPS guidelines and private sector sanitary and quality norms among policy-makers and development agencies At least 10 contracts, MOUs or LOAs signed with collaborating national institutions in the markets analysis and participation areas active in any one year	Major changes are occurring in SPS regulations and private sector norms with respect to international trade in livestock products	Study results that demonstrate change in existing technologies, regulations and norms that affect smallholders' ability to comply with SPS guidelines and private sector norms
3.4 Capacity built among national collaborators and collaborating institutions for assessment of technical, institutional, and policy options to increase the market access of poor, small-scale and disadvantaged livestock producers and consumers	At least 2 national collaborators per IRS staff member make substantive research/outreach visits to ILRI facilities per year to work on joint outputs IRS staff at a minimum have one of every two of their publications co-authored with national collaborators At least one instance per year per IRS of the presentation of a seminar or training course of a methodological nature to a national collaborating institution	Support exists among policy makers for alternative approaches to addressing achieving equivalence in SPS standards	

Activities	*Milestones*	*Preconditions for implementation of activities*	*Indicators*
All outputs, 3.1-3.3 *Document current practices and identify examples of best practice and trends related to smallholder participation in livestock product markets*	*Document current and best practices* Causes and consequences of scaling-up of individual livestock production operations and assessment of options for improving the impact on smallholders identified and documented in a comparative study of selected fast-growing developing countries by 2005 Assessment of institutional barriers to increased small farm sales of small ruminants in Near East-North Africa by 2005 Assessment of potential impacts of changes in SPS regulations on producers in a sample of importing and exporting developing countries by 2005 Assessment of the small-scale production systems in Assam, trends in technology, market changes, intensification; and of the policy and institutional environment in which small-scale milk producers, market agents and processors earn their living, by 2005. Best practices for smallholder inclusion in dairy markets identified and documented from a comparative series of case studies in East Africa and South Asia by 2005 Constraints to smallholder participation in pig, live poultry, and egg markets assessed and documented in Southeast Asia by 2006 Pros and cons of contract farming for livestock in South and SE Asia assessed and documented and policy domains for further research identified by 2006 Characterization and analysis of small ruminant health delivery systems and market access in the near east—North Africa by 2006 Key trends in changing demand attributes for livestock products in a sample of developing countries with different geographical, demographic, and economic characteristics identified and documented by 2007	Interest of partners and development of effective partnerships Sufficient financial and human resources available	Agreements among key stakeholders established and implemented Approved budgets and workplans with adequate human resource allocations
Test new options to enhance smallholder access to markets and services, increase competitiveness and mitigate threats	*Test new options* The potential impact of changes in OECD country animal health and food safety regulations on developing country exports of	Sufficient policy and regulatory support for pro-poor initiatives	Approved policies and regulations. Evidence of implementation

Activities	*Milestones*	*Preconditions for implementation of activities*	*Indicators*
	livestock products, and associated impacts on poor and small-scale producers assessed by 2005 Technical and policy options assessed for improving the efficiency and food safety performance of small scale agents in East African urban markets, in the context of small-scale producers, by 2005 Profitability of investing in forage technology and net farm income at different levels of scale in Central America estimated and reported by 2006 Identification and pilot testing of improved animal health, feeding, breeding, finance and credit, market levies and service strategies to improve delivery of services and market access to poor farmers in selected countries of Near East--North Africa, by 2007	Effective technical and policy partnerships created	Partnerships agreements approved and implemented
Formulate recommendations for better pro-poor policy options	*Formulate policy recommendations* Policy options assessed for decreasing the transfer costs of livestock produced and marketed by poor people and small-scale operators in the Central Sahel and destined for the Central Coast of West Africa by early 2005 Policy recommendations formulated and disseminated of the options for using contract farming of livestock to promote increased smallholder productivity and participation in livestock product markets in South and Southeast Asia by end 2006 Policy options identified and documented for regulatory and institutional change in developing countries that will help meet both external and internal food safety and animal health concerns, while minimizing negative impacts on small-scale producers by 2007	Sufficient policy and regulatory support for pro-poor initiatives	Approved policies and regulations. Evidence of implementation
Build Capacity for Analysis of Options for Market Participation In Developing Countries	*Build Capacity* This an integral part of virtually all the activities of the three operating projects of the Joint Program, with monitorable indicators being the same as for Output 4 above on a Program-wide basis	Partners give high priority to capacity building Financial and other resources available	Agreements with partners and identification and assignment of trainees Approved and implemented budgets and workplans

Project 4: Application of Biotechnology to Secure Assets

Objective

Securing and building the assets of the poor is a cornerstone of poverty alleviation. Disease is a major factor threatening the livestock assets of the poor in low input systems and also limits productivity of, and contribution to income by, these assets. Livestock genetic resources have evolved in diverse environments and carry unique genes that define productive and adaptive capabilities. Use of locally adapted and disease resistant livestock, and development of appropriate interventions, such as diagnostics for disease surveillance, and vaccines and therapeutics for disease prevention and treatment are effective routes to help secure livestock assets of the poor. Approximately one third of known breeds of livestock worldwide, the majority in developing countries, are threatened with extinction. This project aims to apply biotechnology to deliver greater security of, and access to, livestock germplasm through improved health and survival, improved animal genotypes, and development of molecular tools to support forage and food-feed crop germplasm characterization and genetic enhancement. Specific applications of biotechnology in the project include better understanding of the diversity and enhanced utilization of indigenous animal genetic resources and reduction in disease risk and environmental risks through vaccines, better feeds and genetic traits.

Outputs

- New/improved vaccines and diagnostic tools developed for priority diseases
- Genes/genomic regions controlling resistance to trypanosomosis and helminthosis identified and characterized for use in genetic improvement programs to produce adapted and more productive livestock
- Genetic diversity in indigenous livestock populations characterized and strategies for conservation and improved utilization developed
- Expertise and capacity of NARS and other strategic partners to undertake research and development utilising traditional and advanced biotechnologies in animal health and genetics enhanced through biotech research and training

Gains (Impact)

Improved disease control strategies through use of disease resistant livestock and improved diagnostics and vaccines will help secure livestock assets and increase productivity, while also reducing chemical and drug usage hence improving environmental health. Access to information, tools and strategies to support conservation and use of appropriate genetic resources that have better survival and are more productive and less susceptible to fluctuating environments than exotic genotypes in low input systems, thus securing assets, and improving farmers' income and food security. Enhanced capacity development and training transfers technologies into the hands of national and regional partners to drive their own research and development priorities.

Milestones

2005

- Strategic, technical and laboratory support provided for regional vector-borne disease control programmes from 2004 onwards
- Broad mapping of helminthosis resistance genes in sheep completed
- *In situ* conservation of indigenous ruminant livestock of West Africa started
- DAGRIS database harmonised with FAO/DADIS, its functionality extended to include molecular genetic data and first Asian data entered
- Phenotypic characteristics and status of molecular genetic diversity of priority African ruminant livestock breeds assessed and documented
- At least 5 NARS staff trained at MSc/PhD levels in aspects of improved animal health and genetics/genomics technologies between 2003 and 2007

2006

- In partnership with private sector, ECF vaccine schizont candidates evaluated in cattle in the laboratory and in initial field trials and ready for product development and wider field evaluation
- Mechanisms of CBPP pathogenesis and immune responses better understood and used to define screening procedures for vaccine and diagnostic antigen candidate identification
- ELISA for diagnosis of trypanosome infections developed and validated in the laboratory
- Breeding strategies for improvement of disease resistance and productivity of cattle and sheep in low-input production systems developed and ready for field testing
- Fine-scale mapping of helminthosis resistance genes in mice on-going
- Community based management of AnGR tested in at least three countries
- Distribution of molecular genetic diversity of chickens understood at the continental level (sub-Saharan Africa or Asia)
- Tick vaccine candidates identified by creating and screening EST libraries to identify proteins from *R. appendiculatus* and *A. variegatum* tick gut and salivary glands
- Study of field relevance of putative genes controlling trypanosomosis tolerance completed and stop/go decision made on further development of breeding stock
- NARS scientists trained and facilitated to provide technical backstopping of active programs for conservation and utilisation of trypanotolerant livestock in four countries in West Africa (Mali, Senegal, Gambia and Guinea)

2007

- Initial CBPP vaccine antigen candidates identified through immunological screening procedures
- ELISA diagnostic reagents for CBPP developed and validated
- ELISA for diagnosis of trypanosome infections tested in the field
- Decision-support tools for conservation of AnGR in four Asian countries developed and tested (to proof of concept stage)
- Functional genomic studies/improved mapping of trypanotolerance in cattle and mice completed and functional control of resistance and the genes involved identified
- Breed survey instruments for phenotypic characterization and economic valuation of traits available and in use in 2 countries
- Technical and administrative leadership provided to programs for conservation and utilisation of trypanotolerant livestock in West Africa
- Functional genomic studies of resistance to gastro-intestinal parasites in sheep and mice on-going

Users - Government, parastatal and private breeding programmes, NARS, extension services, including veterinary services/laboratories, and individual livestock producers and producer groups

Collaborators

NARS partners: More than 30 in Sub-Saharan Africa, Asia and LAC

ARI partners: University of New England, *Australia*; Ludwig Institute for Cancer Research, *Brussels*; University of Guelph, University of Victoria, *Canada*; Trinity College, Dublin, Eire; University of Goettingen and University of Hohenheim, *Germany*; Hebrew University and University of Haifa, *Israel*; Wageningen Agricultural University, ID-DLO Lelystad, *The Netherlands*; AgResearch, *New Zealand*; ETH Zurich, *Switzerland;* Roslin Institute, Institute for Animal Health, Compton & Pirbright, University of Edinburgh, University of Liverpool, University of Manchester and University of Nottingham, University of Oxford, *United Kingdom;* Animal Research Station, National Animal Germplasm Program of the USDA, USDA Beltsville, Texas A & M University, University of Iowa, The Institute for Genome Research, *United States of America*.

CGIAR partners: Systemwide Genetic Resources Program, ICARDA, ICRAF, ICRISAT, IITA, IPGRI.

Regional and eco-regional partners: ASARECA; SADC; CORAF; ITC, The Gambia; CIRDES, Burkina Faso.

International Organizations: IAEA, Austria; GTZ (and League for Pastoral Peoples, an international NGO), Germany; FAO, Rome.

Private Sector: Agen Pharmaceuticals, Brisbane; Evolutec, Oxford; The Institute for Genome Research, USA; Merial Ltd, Svanova Biotech AB, Uppsala, Sweden.

Cost— US$ 14 million in 2005, increasing to US$ 15.1 million by 2007.

System linkages— Germplasm improvement, Germplasm collection, Sustainable Production, Policy, Enhancing NARS

Project 4: Biotechnology

Hierarchy of activities/objectives	*Indicators*	*Assumptions*	*Indicators for assumptions*
Goal Poverty, hunger and environmental degradation in developing countries are reduced through sustainable livestock production	Aggregate and specific poverty measures in livestock target regions and systems improved	National development strategies and policies devote due attention to rural development and food security	National development strategies and polices adopted and implemented
Intermediate goal Improved health and productivity of livestock through application of advanced biotechnology in livestock disease control and better utilisation of animal genetic resources by resource poor livestock keepers	Active programmes of disease control incorporating new diagnostic and vaccine products and strategies established by partners in at least 2 countries by 2008 At least one community-based breeding programme initiated to improve resistance to a priority disease and/or in-situ conservation of a livestock species of importance to the poor by 2005	**Assumptions for achievement of intermediate goal** Local cultural, political and policy environments enable uptake of improved animal genetic resources by farmers NARS and other partners have effective infrastructure and policy environments and can deliver at low enough cost to allow uptake of interventions by farmers	Reduced disease occurrence documented through monitoring of active disease control programmes At least one example of uptake of improved germplasm by smallholders by 2010
Purpose *Intended response:* New vaccines and diagnostics developed and utilised *Actor:* Public and private research and development sectors *Output utilised:* 4.1 and 4.4 *Innovative behaviour:* Recent advances in biotechnology applied to develop vaccines and diagnostics which are used in integrated disease control strategies *Intended response:* Breeding programmes to develop disease resistant livestock established *Actor:* Public and private research and development sectors *Output utilised:* 4.2 and 4.4 *Innovative behaviour:* Advances in genomics utilised in breeding programmes to develop breeds resistant to trypanosomosis and helminthosis *Intended response:* Animal genetic resources characterised, conserved and utilised *Actor:* Public and private research and development sectors *Output utilised:* 4.3 and 4.4 *Innovative behaviour:* New approaches, strategies and tools developed and utilised for characterisation, conservation and utilisation of animal genetic resources	Diagnostic kits for tick-borne diseases evaluated and validated in 2004 and transferred to a private company for commercial production. At least one pilot breeding programme to improve or to disseminate disease resistant sheep and/or cattle initiated by 2005 At least one pilot *in situ* conservation through utilisation of indigenous animal genetic resources started by 2006		

Outputs	*Indicators*	*Assumptions for achievement of purpose*	*Indicators for assumptions*
4.1 New/improved vaccines and diagnostic tools developed for priority diseases	ECF vaccine developed by 2006 and commercial production started by 2009 Immune screening system in place to identify diagnostic and vaccine candidate antigens for CBPP by 2006 Salivary gland and gut proteins of two tick species characterised and vaccine candidates identified by 2007	National governments, NARS and other stakeholders create policy instruments and devote resources to conservation and utilisation of AnGR Governments, NARS and other stakeholders recognise the social and economic value of genetic improvement programmes and devote appropriate resources to such programmes NARS and other stakeholders recognise the value of new diagnostics, vaccines and other interventions to put in place national and/or regional programs of disease control	New policies available and adopted and resources are allocated by at least two countries or international organisations by 2005 Plans for improvement programmes based on at least one indigenous breed are initiated National and/or regional disease control action plans are established
4.2 Genes/genomic regions controlling resistance to trypanosomosis and helminthosis identified and characterized for use in genetic improvement programs to produce adapted and more productive livestock	Functional genomic studies of trypanosome tolerance and helminth resistance underway by 2005 Field testing of strategies for marker-assisted breeding for sustainable improvement of disease resistance initiated in 2004 Broad-scale mapping of genes controlling helminthosis resistance in sheep completed in 2005		
4.3 Genetic diversity in indigenous livestock populations characterized and strategies for conservation and improved utilization developed	Continental level genetic diversity assessment of African ruminant livestock and chickens completed and results published by end of 2006 and similar work initiated in Asia by 2004 Methods for breed surveys and on-farm phenotypic characterisation and valuation of AnGR published and available for wider use by 2005 Genetic resource database for cattle, sheep and goats in Africa expanded to other species and regions with enhanced capabilities, including decision-support tools and strategies for characterization, valuation and conservation/use by end of 2006 Essential elements underpinning a sustainable breeding programme for trypanotolerant livestock put in place by 2006 as part of a 10-year *in situ* conservation programme in West Africa		
4.4 Expertise and capacity of NARS and other strategic partners to undertake research and development utilising traditional and advanced biotechnologies in animal health and genetics enhanced through biotech research and training	Staff of NARS and other partners apply techniques learned through ILRI-led training courses and other capacity development initiatives NARS scientists with better training/experience in biotech research and applications are employed within NARS institutions and other organisations		

Activities	*Milestones*	*Preconditions for implementation of activities*	*Indicators*
Output 4.1 *Identify and evaluate candidates for diagnostics and vaccines for priority diseases*	*Identify and evaluate candidates for diagnostics and vaccines* Mechanisms of CBPP pathogenesis and immune responses elucidated and vaccine and diagnostic candidates for CBPP identified by end of 2006	Sharing of information and resources among AnGR holding countries takes place without major obstacles arising from sovereignty issues	Information flows to and from most collaborators regularly and without apparent restriction
	Tick vaccine candidates identified and evaluated by creating and screening EST libraries to identify proteins from *R. appendiculatus* and *A. variegatum* tick gut and salivary glands by end 2006	Collection and movement of DNA for genotyping takes place without major sovereignty or technical barriers	Biological samples arrive at ILRI and other collaborating laboratories from most countries on a regular basis
	In partnership with private sector, ECF vaccine schizont candidates evaluated in cattle in lab and field and ready for product development by end of 2006 and vaccine ready for delivery by 2009	Facilities, carriers and legal and policy frameworks continue to allow movement, storage and manipulation of disease organisms and their vectors and the undertaking of appropriate animal experiments	
Develop diagnostics for priority diseases	*Develop diagnostics* Diagnostic kits for four tick-borne diseases evaluated and validated in 2004 and handed over to private company for commercial production		
	ELISA for diagnosis of trypanosome infections developed and validated by 2006		
	ELISA diagnostic reagents for CBPP developed and validated by end 2007		
Provide technical backstopping to regional disease control programmes	*Provide technical backstopping to regional disease control programmes* Strategic, technical and laboratory support provided for regional vector-borne disease control programmes from 2004 onwards		
Output 4.2 *Develop/identify and utilise better tools to facilitate genomic studies*	*Develop/identify and utilise genomic tools* Better tools developed/identified and utilised for genetic marker studies: • Broad, ultra fine-scale mapping of helminthosis resistance genes in sheep and mice completed by end 2005 and 2006, respectively • Study of field relevance of putative genes controlling trypanosomosis tolerance completed in 2007 and stop/go decision made on further development of breeding stock		
	Functional genomic studies/improved mapping of disease tolerance in cattle, sheep and mice		

	completed and functional control of resistance and the genes involved identified by 2007		
Formulate breeding strategies for improved disease resistance and productivity	*Formulate breeding strategies* Breeding strategies for improvement of disease resistance and productivity of cattle and sheep in low-input production systems developed and ready for field testing by end 2006		
Output 4.3 *Characterise, document, conserve and utilise animal genetic resources (AnGR)*	*Characterise, document, conserve and utilise AnGR* DAGRIS database harmonised with FAO/DADIS, its functionality extended and first Asian data entered in 2005 and beyond *In situ* community based management (CBM) of livestock genetic resources tested in selected countries: • *in situ* conservation of indigenous ruminant livestock started in at least 4 countries by end of 2005, early 2006 Distribution of molecular genetic diversity of chickens unravelled at the continental level (sub-Saharan Africa or Asia) by 2006 Phenotypic characteristics and status of molecular genetic diversity of priority African ruminant livestock breeds assessed and documented by end of 2005 Breed survey instruments for phenotypic characterization and economic valuation of traits available and in use by end of 2007	Communities supportive of cooperative community based breeding identified and requisite government political support available at all levels	
Output 4.4 *Strengthen capacity in biotechnology for animal health and genetic improvement*	*Strengthen capacity in biotechnology* At least 10 NARS staff trained at MSc/PhD levels in aspects of improved animal health and genetics/genomics technologies between 2003 and 2007 NARS scientists trained and facilitated to provide technical backstopping of active programs for conservation and utilisation of trypanotolerant livestock in four countries in West Africa (Mali, Senegal, Gambia and Guinea) Decision-support tools for conservation of AnGR in four Asian countries developed and tested (to proof of concept stage) by 2006		

Project 5: People, Livestock and the Environment

Objective

Holistic, integrated and community-based approaches that encompass health and nutrition of the poor, the increasing pressure on the natural resources that sustain their livelihoods and options to increase agricultural productivity suitable to their resource endowment, are required to effectively reduce rural poverty. By using such approaches in addressing opportunities at the interface of human well-being, livestock production and the environment, this project provides an entry point to enhance human health and nutrition, ensure the sustainability of agro-ecosystems is maintained and improve livestock production. The research takes an integrated natural resource management approach, considering both the positive and negative effects of livestock and their products on the health of livestock keepers, agro-ecosystems and changing land use systems. Central to this approach is the application of sustainable production practices in which the synergies from crop-livestock integration are captured. Forages and food-feed crops are used as targeted inputs in smallholder systems, to enhance productivity, natural resource management efficiency and human well-being.

Outputs

- Livestock-related options such as feed sourcing, watering practices, grazing and animal waste management strategies for improved use and conservation of water and soil are available for adoption by institutions and livestock keepers
- Policy makers, national and community organisations and household members use improved information, strategies, and processes to develop better policies, innovate new solutions, and strengthen their capacity to improve livelihoods and land management in smallholder livestock systems
- Strategies to reduce health risks and improve nutritional benefits associated with livestock keeping designed and applied to improve human health and well-being
- Fodder constraints facing resource poor crop-livestock farmers are alleviated to improve livelihoods
- Forage diversity saved, studied and used to contribute to agricultural sustainability of smallholder farming systems

Gains (impact)

This project will identify strategies based on research of sustainable livestock production practices to enhance livelihoods of the poor through their contribution to better natural resource management and agro-ecosystem health. An important contribution will be to address, in a holistic manner, the links between livestock and human health, water, nutrition, agricultural production and land use change. The strategic use of animal-source foods to improve the nutrition of the poor, particularly young infants and children, will be confirmed and promoted. It will also provide a unique opportunity to bridge the gap between veterinary and medical perspectives regarding zoonotic and food-borne diseases. The productivity and sustainability of crop-livestock systems will be increased through improving the animal feed value of residues from major crops and the targeted use of forages.

Milestones

2005

- Map showing Nile basin hotspots and targets identified for focused R&D in relation to livestock-water interactions produced (with Project 1)
- Synthesis report distributed and recommendations submitted relating to emerging issues and trends on the contribution of livestock to water use efficiency in the Nile basin
- At least 5 Masters degree thesis projects studying livestock-water interactions completed
- Methodological guide and five policy briefs on causes of land use change, biodiversity loss and land degradation for East Africa completed and distributed
- Research priorities on the links between livestock keeping and coping with HIV/AIDS in resource-poor populations formulated in collaboration with various partners
- Review of evidence relating livestock keeping and health and nutritional well-being in resource poor populations completed and published

- Working paper drafted reviewing measures of health and nutritional status for use as outcome indicators in poverty studies (with Project 1)
- Benefits and health risks associated with urban dairying in Nairobi characterized, health risks associated with relative importance of potential zoonoses described, and mitigation strategies proposed in project reports
- A report characterising urban livestock systems in Kigali completed
- A toolkit for urban and peri-urban health risk assessment methodologies prepared as a manual
- Working paper on theoretical framework and data collection techniques for cysticercosis disease burden valuation
- Econometric analysis of the viability of tsetse and trypanosomosis control strategies in Uganda reported in a Ph.D. thesis
- 20% of the accessions in the forage genebank assessed for seed quality and regeneration programmed
- Information about exploitable variations in fodder value of pearl millet and sorghum crop residues available to crop improvement, varietal releasing agents and seed industry
- Strategies for high feed carbon and nitrogen efficiencies on diets designed from crop residues of sorghum, pearl millet and wheat and from bran and citrus and sugar beet pulp developed and validated
- Superior dual purpose cultivars from already released cultivars of groundnut and pigeonpea identified
- Strategy developed for increased information, dissemination and use of forage resources in relation to end user perceptions (with Project 2)
- For at least 10 fodder options in Nigeria and India, technical and instructional information specific to service providers and their clients available for testing
- SoFT, a user friendly database of forage resource information, launched and availed
- Publication of characterization information on nutritional traits for cowpea and Napier grass
- Agreements and procedures established for duplication of the forage germplasm collection
- At least five seed and planting material delivery systems for fodder resources surveyed and evaluated in Nigeria and India
- At least three graduate associates trained in fodder characterization methodology

2006

- Case studies from two key livestock-water priority regions reported
- A GIS decision support tool relating livestock production and water use developed and tested (with Project 1)
- At least 40 working papers on the causes of land use change, biodiversity loss and land degradation for East Africa completed and distributed
- At least two syntheses including assessments of land degradation, biodiversity conservation and climate change in Sahelian ecosystems of southern Niger completed and made available for NARS and other partners
- Case studies from Ethiopia about feeding practices, nutritional status and morbidity in children, and on the role of livestock keeping and use of animal-source foods completed and preliminary results reported
- Priority health risks associated with cattle/dairy production in Nigeria described and quantified in project reports, and mitigation strategies developed in consultation with stakeholders
- Relationship between laboratory fodder traits and livestock productivity determined, superior dual purpose cultivars identified and NIRS equations established for cowpea, maize and rice
- Synthesis of approaches for determining and targeting appropriate options to address farmer needs for improved feed resources and feeding strategies completed and reported (with project 1)
- Fodder value of crop residue considered under the "added value" concept in varietal releasing process in sorghum and pearl millet
- Information about exploitable variations in fodder value of the crop residues available to crop improvement, varietal releasing agents and seed industry for groundnut and pigeonpea
- At least one third of the accessions in forage genebank assessed for seed quality
- Basic data for SINGER verified on 15,000 forage accessions
- A forage image database developed using least 500 images

- Synthesis of information on a range of multi-stakeholder partnerships appropriate for scaling up and out of fodder innovations in 3 production systems in each Nigeria and India completed and report distributed (with project 2)

2007

- Synthesis paper on options to improve water productivity through livestock mediated strategies written and distributed
- Policy recommendations formulated indicating implications of R&D options in Nile basin with respect to targeting of improved livestock and water management options
- One high profile book on pastoralism and wildlife in East Africa in final draft
- One global synthesis of the effects of intensification and loss of scale in rangelands in final draft
- Five policy briefs on issues relating to land use change completed and distributed
- Two assessments on herder-farmer conflicts for West and East Africa available for partners
- Role of animal-source foods in the diets and nutritional status of Ethiopian children described in Ph.D. thesis
- Econometric analysis of the associations between livestock-keeping, animal-source food expenditure patterns, animal-source food consumption, and child nutritional status characterized in the sample of Ethiopian households reported in Ph.D. thesis
- Economic impact assessment of cysticercosis in eastern and southern Africa completed, reported and a peer-review publication for an integrated framework drafted
- Methodology for evaluating the incidence and impact of zoonotic and food-borne diseases affecting the poor in representative livestock production systems developed and tested
- Priority health risks associated with principal urban livestock production systems in Kigali described and quantified in project reports, and mitigation strategies developed in consultation with stakeholders
- Capacity to support pig R&D strengthened in Eastern and Southern Africa through graduate students (7 Masters and 2 PhD) and on-the-job training among veterinary research and laboratory staff in 4 countries
- Information about exploitable variations in fodder value of the crop residues available to crop improvement, varietal releasing agents and seed industry for cowpea maize and rice
- Year round on-farm and purchased fodder resources quantified and quality established for selected NDDB-associated dairy cooperatives in India and appropriate supplementation strategies developed
- Duplicate collection of key forage species located in another appropriate institute
- Seed quality of all forage genebank accessions determined
- General training materials and forage fact sheets for at least 20 best bet forages for management and seed multiplication developed and translated into local languages in 2 countries (with project 2)
- At least 300 farmers and NARES partners trained in forage and forage seed production technologies

Users—Farmers, development agents, NARS, veterinary and public health agencies; policy makers and researchers

Collaborators

NARS partners:
Danish Bilharziasis Laboratory; Royal Veterinary and Agricultural University of Denmark, *Denmark*
Ada Liben Wereda, Addis Ababa University, Alemaya University of Agriculture CARE-Ethiopia, EARO, Ethiopia Health & Nutrition Research Institute Regional authorities in Ethiopia, The Ethiopian Rainwater Harvesting Association, Mekele University, Oromia Agricultural Research Organization, Sasakawa Global 2000, *Ethiopia*; ANTHRA, BAIF Development Research Foundation, Indian Council of Agriculture Research, Indian Veterinary Research Institute, Izatnagar Angaru Agricultural University, Rural Development Trust, SAndhra Pradesh, *India;* KARI, KETRI, University of Nairobi, *Kenya;* FITCA-Uganda, LIRI, Makerere University, NARO,The Ugandan Rainwater Harvesting Association, *Uganda*; Bauchi State Agricultural Development Project, Federal Livestock Department, IAR, JDPC, KADP, Lake Chad Research Institute, NAPRI, NLPD, *Nigeria*; Ministry of Science and Technology, *Sudan;* Sokoine University, *Tanzania*; Cargill Animal Nutrition*, United States of America.*

ARI partners: CSIRO, *Australia*; Guelph University, *Canada;* University of Hohenheim, *Germany*; Swiss Federal Institute of Technology, Swiss Tropical Institute
Switzerland; CTVM, University of Edinburgh, University of Reading, United Kingdom; Cornell University, *United States of America.*

CGIAR partners: CIAT, ICRAF, ICRISAT, IFPRI, IITA, IWMI, SLP, DMP, SGRP, CAPRi, SIMA, IRRI, WARDA, CIP, ICARDA, Urban Harvest.

Regional and ecoregional partners: APAARI, ASARECA, AU-IBAR, CAWMA, GMP, The African Highlands Initiative, CPWF, Etudes Pluridisciplinaires pour l'Habitation et Travaux Annexes (EPHTA), Rice-Wheat Consortium.

Private partners:

Cargill Animal Nutrition (USA).

Cost— US$ 6.7 million in 2005, increasing to US$ 7.3 million by 2007.

System linkages— Germplasm improvement, Germplasm collection, Sustainable production, Policy and Enhancing NARS.

Project 5: People, Livestock and the Environment

Hierarchy of activities/objectives	*Indicators for achievements*	*Assumptions*	*Indicators for assumptions*
Goal To reduce poverty by improving human health and enhancing sustainable management of natural resource assets through livestock-based interventions	Aggregate and specific poverty measures in livestock target regions and systems improved	National development strategies and policies devote due attention to rural development and food security	National development strategies and polices adopted and implemented
Intermediate goal Adoption of livestock management, feeding options and policies to improve the integrity, reslience and quality of ecosystems, reduce the impact of zoonotic diseases leading to improved livelihoods for poor households/communities	Number of communities empowered assessed against recognised indicators Collaborating farmers demonstrate increased use technology options originating from this research Non-collaborating farmers and communities adopt technology originating from research and enabling policy for this change integrated in rural development planning.	*Assumptions for achievement of overall goal* Appropriate government institutions accept research recommendations	Policy documents published
Purpose *Intended response:* Improved pro-poor policies *Actor:* Policy makers in environment, agriculture and health *Output utilised*: 5.1, 5.2 and 5.3 *Innovative behaviour:* Policy makers utilise research results, synthesized and documented to make them accessible, to develop pro-poor policies and strategies *Intended response:* Improved practice informed by better understanding of livestock/health/environment issues *Actor:* NARS *Output utilised:* 5.2 *Innovative behaviour:* NARS test, adapt and promote options, based on pro-poor research results and new tools, that enable community-led management for sustainable land use and transfer successful approaches between domains *Intended response:* Capacity built for supporting better feed options for smallholder farmers *Actor:* NARS and Agricultural Supply Chains *Output utilised:* 5.4 and 5.5 *Innovative behaviour:* NARS, actors in agricultural supply chains, development agencies, policy makers and community members are enabled to use livestock management options including improved water, nutrient, land management, livestock feeding strategies and related policies to enhance the human health, natural resource assets and livelihoods of smallholder livestock keeping households	NARS, development agencies, private enterprise and CG partners include livestock related approaches to improve human health and natural resource management in at least five targeted systems/locations	*Assumptions for achievement of intermediate goal* Institutional support for the application of strategies and approaches and for the uptake of technologies and outputs of theme are established in target countries	ILRI and partner budgets, workplans and reports

Outputs	*Indicators*	*Assumptions for achievement of purpose*	*Indicators for assumptions*
5.1 Livestock-related options such as feed sourcing, watering practices, grazing and animal waste management strategies for improved use and conservation of water and soil are available for adoption by institutions and livestock keepers.	At least two livestock based strategies contributing measurable improvements in water productivity available for NARS and other partners in five countries At least one option for improved livestock mediated soil nutrient management in one of each nutrient depleted and nutrient overloaded systems available for NARS and other partners in three countries	NARS and other stakeholders adopt improved innovation-systems approaches Candidate improved technologies and policies are appropriate for evaluation and dissemination	Reports and publications from NARS and other stakeholders Requests and utilisation of information, reports, publications
5.2 Policy makers, national and community organisations and household members use improved information, strategies, and processes to develop better policies, innovate new solutions, and strengthen their capacity to improve livelihoods and land management in smallholder livestock systems	A range of approaches enabling community led management of land use change through livestock options are being effectively used and cited by partners, policy makers and other research organisations in at least three SSA countries Livestock mediated strategies developed by ILRI and partners in East Africa for sustainable management of resource assets to improve livelihoods under changing land use are being used by partners in at least two countries in West Africa and one in Asia	NARS and other stakeholders have the resources needed to use and disseminate theme outputs	NARS and other stakeholders reports, activities, workplans, budgets/funding
5.3 Strategies to reduce health risks and improve nutritional benefits associated with livestock keeping designed and applied to improve human health and well-being	A synthesis of options and approaches to improve the contribution of livestock and their products especially for strategic at-risk groups among the poor is available and used for development efforts by stakeholders in at least three countries in SSA Approaches for the diagnosis and strategies to reduce the risk of zoonoses in peri-urban livestock systems are available and used by NARS and other partners in smallholder livestock production systems Diagnostic tools and control strategies for cysticercosis, including biophysical and policy options are being used by consortia of partners in at least four countries in SSA Awareness raised about role of key animal-sourced micronutrients at critical stages of child growth increased in the scientific literature and through nutrition education messages, and consumption of animal-sourced micronutrients increased in at least one intervention site in SSA		
5.4 Fodder constraints facing resource poor crop-livestock farmers are alleviated to improve livelihoods	*Ex ante* assessment of a range of food-feed crops is available and used by ILRI and partners to target research on feeds and feeding strategies in three countries Recommendations are available to international and national partners involved in crop breeding and livestock production that enable targeted development and utilisation of feed options in five countries ILRI forage genebank is used as a strategic resource for fodder material and linked to partners working at field level in at least four countries		
5.5 Forage diversity saved, studied and used to contribute to agricultural sustainability of smallholder farming systems	An approach to target forage strategies and options that encompasses essential aspects of the research to development continuum, including seed and delivery systems is available and being used by partners in at least five countries		

Activities	*Milestones*	*Preconditions for implementation of activities*	*Indicators*
Document and disseminate information on role of livestock in water and nutrient management and related livestock/gender issues (in collaboration with partners including NARES and NGOs*)*	*Document and disseminate* GIS stratification of SSA with respect to livestock water systems completed by end 2005 and published in CPWF, ILRI, and FAO web sites with peer-review papers submitted to one or more professional journals.	Effective partnerships created and strengthened involving key institutions such as ASARECA-AARNET, NGOs, CPWF, FAO established.	Agreements among key stakeholders established and honoured.
	Contribution of "livestock" component to a larger IWMI, WB, AfDB, IFAD and FA0 led investment study on agricultural water for SSA giving emphasis to the need to invest in water for livestock development and to invest in better livestock keeping that helps conserve water resources completed by 2005	Sufficient financial, human and other resources are made available in timely manner.	
	Map produced showing Nile basin hotspots and targets identified for focused R&D in relation to livestock-water interactions by end 2005		Budgets approved and funds made available; ILRI and partners' personnel committed to the research.
	Synthesis report written and distributed providing an overview and analysis of the contribution of livestock to water use efficiency in the Nile basin by end 2005		
	Synthesis paper written and distributed describing options to improve water productivity through livestock mediated strategies such as improved watering, grazing, conservation tillage and feed sourcing by end 2007		
Increase capacity of partner institutions (NARES, NGOs, and selected communities) to understand and conduct R&D on integrated livestock and water management.	*Increase capacity* At least 5 Masters degree theses completed that bring new insights into critical livestock-water interactions by 2005	Universities, NARES, policy makers and NGOs recognise and respond to the need to strengthen livestock and water research and management capacity.	Agreements with partner institutions
	Synthesized results published on livestock-water interactions through the Comprehensive Assessment on Water Management in Agriculture and at least two papers submitted to peer-review journals by the end of 2005.		
	5 PhD students recruited and undertaking research projects in the Nile Basin by 2005 with theses submitted by end of 2007	Partners' give high priority to capacity building.	Identification and assignment of thesis candidates.
Execute case studies in selected Nile basin hotspots where livestock-water interactions are important in collaboration with NARES, university and NGO partners.	*Execute case studies* At least two case study sites established and agreements with participating communities/NGOs in place, in different priority production systems within or very near to the Nile Basin by the end of 2005	Financial and other resources are available.	Approved budget in place.
	Case studies from two key livestock-water priority regions reported by 2006	CPWF and/or other funding in place to enable project implementation.	Approved budget in place.
Formulate recommendations for investments in agricultural water for livestock and for more integrated livestock-water management that address livestock development needs in SSA in collaboration with IWMI.	*Formulate recommendations* Recommendations submitted and presented in a workshop to AfDB and other major stakeholders for investment options in use of agricultural water for livestock development and for improved livestock keeping practices that help conserve water resources in SSA (2005).	Hotspots have been identified.	Hotspot report available.
	Emerging issues and trends that can help stakeholders understand the need for improved water productivity and reduced water degradation resulting from poor livestock keeping in the Nile Basin published under the CPWF by 2005	Communities consider livestock-water interactions a priority and are willing to collaborate	Community level agreements for collaboration in place.

	Policy recommendations formulated indicating implications of R&D options in Nile basin with respect to targeting of improved livestock and water management options published through CPWF communication channels, ILRI and FAO web pages, policy briefs and peer-reviewed journals by end 2007	Sufficient ILRI personnel input available	Time and budget commitments/workplans
Develop and test pilot tools (policy, technology, and dissemination) related to livestock/water issues in collaboration with FAO and other partners.	*Develop and test pilot tools* A GIS decision support tool relating livestock production and water use developed and tested by end 2006		
	State-of-the-art technological options relevant to improving livestock water productivity identified for food sourcing, watering, grazing and waste management technologies and disseminated through CPWF communication channels, ILRI Web pages, and the FAO web-pages for LEAD toolbox by end 2006.	CPWF project is successfully launched in 2004 and continues to function.	Annual progress CPWF reports.
	At least two peer reviewed papers submitted for publication by the end of 2006 that describe technical options for better managing livestock-related nutrient depletion and livestock-related overload in agricultural production systems; and related technical briefs available	PhD student recruited to focus on toolbox development	Student enrolled
Strengthen capacity of key partner institutions, researchers and community members to develop, test and support better strategies and options for sustainable land use and management by the poor in smallholder livestock systems	*Strengthen capacity* Demands for research information on land use change met in 25 pastoral communities in East Africa by end 2005	Community members and wildlife institutions willing and able to participate in training activities	Appropriate memorandums of understanding in place
	Natural resource databases made distributed to at least 200 decision makers by 2006	Decision makers are willing and able to use database	Appropriate memorandums of understanding in place
	Five training courses conducted to build capacity for 5 institutions, 30 researchers, and 20 policy makers to better manage land, livelihoods and biodiversity in East Africa by 2007		
Document and disseminate key issues to stakeholders in relation to sustainable management of rangelands by ILRI with communities and policy makers	*Document and disseminate* Synthesis of ILRI activities on land degradation and biodiversity conservation in Niger completed and distributed by end 2004	Data, methods and recommendations being generated continue to be useful and needed by national partners and others	Needs assessments are carried out, and show that information is generated in response to the needs of partners
	Analysis of linkages between land use change, biodiversity and land degradation in selected East Africa sites completed and report shared with stakeholders by end 2004	National and local partners have the resources to retain and use trained staff	Global databases can continue to be accessed in collaboration with partners
	Assessment of land cover/use and wildlife diversity in pastoral systems of East Africa completed and report available by 2005		
	At least 40 working papers on the causes of land use change, biodiversity loss and land degradation for East Africa completed and distributed by end 2005 At least two syntheses including assessments of land degradation, biodiversity conservation and climate change in Sahelian ecosystems of southern Niger completed and made available for NARS and other partners by end 2006		
	One high profile book on pastoralism and wildlife in East Africa in final draft by 2007		

Formulate and disseminate management and policy options for sustainable land use/natural resource management, reduced conflict and improved livelihoods of poor livestock keepers in marginal lands *Describe and disseminate linkages* between livestock-keeping and health and nutritional well-being for representative smallholder livestock production/ market systems by ILRI in partnership with ARIs, NARSs, NGOs and local communities *Develop and test methodologies* to assess impacts of zoonotic and food-borne diseases that affect the poor by ILRI in collaboration with ARIs, NARs, and local communities	One global synthesis of the effects of intensification and loss of scale in rangelands in final draft by 2007 *Formulate policy* Five policy briefs annually, on issues relating to land use change completed and distributed by each 2005, 2006 and 2007 Two assessments on herder-farmer conflicts for West and East Africa available for partners by 2007 *Describe linkages* Review paper of the links between livestock keeping and coping with HIV/AIDS in resource-poor populations (with Project 2, and research priorities formulated in collaboration with various partners by end 2005 Review of evidence relating livestock keeping and health and nutritional well-being in resource poor populations, including identification of knowledge gaps and key indicators, completed and published by end 2005 Working paper drafted reviewing measures of health and nutritional status for use as outcome indicators in poverty studies (with Project1) by end 2005. Case studies from Ethiopia about feeding practices, nutritional status and morbidity in children, and on the role of livestock keeping and use of animal-source foods in the households of the study children completed and preliminary results reported by end 2006 Role of animal-source foods in the diets and nutritional status of Ethiopian children described in PhD thesis based on survey data and food laboratory analyses by end 2007 Econometric analysis of the associations between livestock-keeping, animal-source food expenditure patterns, animal-source food consumption, and child nutritional status characterized in the sample of Ethiopian households and reported in PhD thesis by end 2007 *Develop and test methodologies* Benefits and health risks associated with urban dairying in Nairobi characterized, health risks associated with relative importance of potential zoonoses described, and mitigation strategies proposed in project reports by end 2005 A report characterising urban livestock systems in Kigali completed by end 2005 A toolkit for UPA urban health risk assessment methodologies prepared as a manual by end 2005 Working paper on theoretical framework and data collection techniques for cysticercosis disease burden valuation by end 2005	Sufficient ILRI resources are allocated to development of research on human health impacts Ethical approval for proposed research studies is obtained from research institutions and national authorities Collaboration with appropriately qualified partners is established and qualified graduate students are recruited and supported to successful completion of their degree programs Donor funding is attracted to support proposed projects Appropriate partners are identified and effective partnerships established to achieve collaborative research outputs	Annual ILRI staff work plans and budgets Project documentation ILRI and project reports, student theses Project documents Project documents

	Priority health risks associated with cattle/dairy production in Nigeria described and quantified in project reports and mitigation strategies developed in consultation with stakeholders by end 2006	Epidemiological evidence generated regarding the importance of cysticercosis in SSA and elsewhere convincingly demonstrates the need for a major regional and global control effort	National policy documents reporting medical and veterinary priorities
	Economic impact assessment of cysticercosis in eastern and southern Africa completed and reported by end 2007		
	Methodology for evaluating the incidence and impact of zoonotic and food-borne diseases affecting the poor in representative livestock production systems developed and tested by end 2007	Adequately qualified graduate students recruited and successfully complete their degree programs	ILRI and project reports, student theses
	Priority health risks associated with principal urban livestock production systems in Kigali described and quantified in project reports, and mitigation strategies developed in consultation with stakeholders by 2007		
	Economic animal and human health costs of cysticercosis assessed in an integrated framework, and used to evaluate control strategies by 2007 reported in a peer-reviewed publication		
Develop and promote improved policies and strategies at national and regional levels to control priority zoonoses and food-borne diseases that affect the poor by ILRI in partnership with WHO, FAO, ARIs, and national veterinary and human medical personnel and policy makers	*Improved policies and strategies* Econometric analysis of the viability of tsetse and trypanosomosis control strategies in Uganda reported in a Ph.D. thesis by end 2005		Reports and peer reviewed journals
	Pig production and marketing systems characterized and impact of major pig diseases assessed through epidemiological and socio-economic studies, in project reports and MSc and PhD theses by 2007		NIRS equations shared across institutes
	Capacity to support pig R&D strengthened in Eastern and Southern Africa through graduate student (7 Masters and 2 PhD) and on-the-job training among veterinary research and laboratory staff in 4 countries. By 2007	Adequate staffing and funding	Training courses in NIRS application to crop residue analysis
Approaches and criteria for selection of superior food-feed crops and forages identified by ILRI in partnership with Ethiopian Agricultural Research Organisation (EARO), Ethiopian Veterinary Research Institute (EVRI), Indian Veterinary Research Institute (IVRI), Indian National Research Centre for Sorghum (NRCS), Indian Directorate of Rice (DOR), IITA, WARDA, CIMMYT, ICRISAT, University of Hohenheim	*Identify approaches and criteria* Relationship between laboratory fodder traits and livestock productivity determined and reported for groundnut and pigeonpea by end of 2005 and for cowpea, maize and rice by end of 2006.	Maize and rice work funded	Crop improvement workshops Crop improvement reports Reports and peer reviewed journals
	Establishment and across institutional (CG;s NARES, private industry) sharing and exchange of NIRS equations for predicting pertinent laboratory fodder quality traits for groundnut and pigeonpea by end of 2005 and for cowpea maize and rice by end of 2006.	Maize and rice work funded	Varietal releasing reports
	Information about exploitable variations in fodder value of the crop residues disseminated by means of reports and publications to crop improvement, varietal releasing agents and seed industry for pearl millet and sorghum by end of 2005, for groundnut, and pigeonpea by end of 2006 and for cowpea, maize and rice by end of 2007.		

Improved food-feed and forage crop genotypes *made available* by ILRI in partnership with Ethiopian Agricultural Research Organisation (EARO), All India Coordinated Sorghum, Pearl Millet, Groundnut, Pigeonpea and Rice Improvement Programs, Private and public seed industry, IITA, WARDA, CIMMYT, ICRISAT *Strategies* for optimized feeding systems developed by ILRI in collaboration with Ethiopian Agricultural Research Organisation (EARO) Ethiopian Veterinary Research Institute (EVRI) Indian Veterinary Research Institute (IVRI) Indian National Dairy Development Board, Cargill Animal Nutrition, USA, University of Hohenheim, Germany Environmental Protection Agency, USA *Market research on feed options* implemented in collaboration with all ILRI themes, together with Indian National Institute of Animal Nutrition and Physiology (NIANP) and National Centre for Agricultural Economics and Policy Research, Kenyan Agricultural Research Institute and with Ethiopian Agricultural Research Organisation *Conserve and make available* forage germplasm	Synthesis of approaches for determining appropriate options to address needs for improved feed resources and feeding strategies in mixed crop-livestock systems in West/East Africa and South Asia completed and reported by end 2006 *Make available food-feed and forages* Fodder value of crop residue considered and documented under the "added value" concept in varietal releasing process in sorghum and pearl millet by 2006 and for groundnut and pigeonpea by 2007 Identification of superior dual purpose cultivars from already released cultivars of groundnut and pigeonpea by end of 2005 and of cowpea, maize and rice by end of 2006. (seed labelling and extension material) *Develop strategies* Year round on-farm and purchased fodder resources described quantitatively and qualitatively for selected NDDB associated dairy cooperatives in India and appropriate supplementation strategies developed by 2007 Manuscript available describing head box and field technique (SF_6) for estimation of ruminal methane production by 2005 and used for validation of simple *in vitro* techniques for estimation of ruminal methane production from small sample quantity. Strategies for high feed carbon and nitrogen efficiencies on diets designed from crop residues of sorghum, pearl millet and wheat and from bran and citrus and sugar beet pulp as derived from *in vitro* information developed and validated by mid 2005. *Undertake market research* Recommendations for targeting feed options in relation to *ex ante* assessments completed and reported by end 2006 NARES scientist and senior technicians trained in fodder-analytical approaches required for multidimensional crop improvement *Conserve germplasm* 20% of the accessions in the forage genebank assessed for seed quality and regeneration programmed as appropriate by end of 2005 Strategy developed for increased information, dissemination and use of forage resources in relation to end user perceptions by end of 2005 At least one third of the accessions in forage genebank have been assessed for seed quality by end 2006 Basic data for SINGER will be verified on 15,000 accessions by end 2006	Institutional arrangements for changing releasing criteria to include feed related aspects in place NDDB-ILRI pilot project develops into comprehensive project Required external technical inputs and expertise available in time ILRI-CARGILL proposed collaboration materialises Accurate prediction of development of biophysical and economic factors possible Appropriate institutional coalition formed Interest of donor and adequate funding Interest of regional networks such as ASARECA to fund regional training curses Identification of new funding sources after 2006 Appropriate institutions willing and able to host duplicate collections	Seed advertising and labelling Extension material and flyers Change in NDDB fodder recommendation for dairy cooperatives and change in concentrate formulation Reports and peer-reviewed journals International training courses Reports and peer-reviewed journals Changes in diet formulations Reports Reports Manuals Web pages Requests from organisation and individuals for training and secondment of staff Budget information Appropriate memoranda of understanding in place

Disseminate information and decision support tools on adaptive and production traits of forage *Formulate and test* delivery systems to support wider use of new fodder options *National capacity* in forage conservation, characterization, research and development strengthened	Duplicate collection of key species located in another appropriate institute by end 2007 *Disseminate information and decision support tools* For at least 10 fodder options in Nigeria and India, technical and instructional information and training materials specific to service providers and their clients available for testing by end 2005 SoFT, a user friendly database of forage resource information, launched and made available by end 2005 Publication of characterization information on nutritional traits for cowpea and Napier grass by end 2005 A forage image database developed using least 500 images by end 2006 Seed quality of all genebank accessions determined by end 2007 Synthesis of information from on-going activities and partner experiences on a range of multi-stakeholder partnerships appropriate for scaling up and out of fodder innovations in 3 production systems in each Nigeria and India completed and report distributed by end 2006 *Formulate and test delivery systems* Agreements and procedures established for duplication of the forage germplasm collection by end of 2005 At least five seed and planting material delivery systems for fodder resources surveyed and evaluated in Nigeria and India by 2005 *National capacity* General training materials and forage fact sheets for at least 20 best bet forages for management and seed multiplication developed and translated into local languages by end 2007 At least three graduate associates trained in characterization methodology by 2005 At least 300 farmers and NARES partners trained in forage and forage seed production technologies by 2007	NARS, NGOs and other stakeholders are able to access and use information to promote forage interventions	Reports and publications from stakeholders Seed request and production statistics

Project 6. CGIAR Systemwide Livestock Programme (SLP)

Objective

Mixed crop-livestock small-scale farming systems are an important target for the CGIAR system. In these systems, livestock are a critical resource for improving farm productivity, income and market opportunities and overall household livelihoods. Agricultural research in these systems benefits greatly when individual CGIAR Centres and their local partners combine in a research consortium to share research experiences and organizational resources across agricultural sectors and from one geographic area to another. These are the *raisons d'être* of the CGIAR Systemwide Livestock Programme (SLP). The Programme builds upon the expertise and investments of 11 CGIAR centres on food crops, natural resource management and policy/institutional analysis to promote synergies and leverage system's resources to address the global research needs of small-scale crop-livestock in a coherent and integrated manner. The SLP works through CGIAR partners and consortia involving national agricultural research systems of developing countries, advanced research institutes of developed countries, government and non-government development organizations and the private sector. Through these partnerships the Programme seeks to contribute to the CGIAR and Millennium Development Goals of reducing poverty by enhancing the productivity and sustainability of crop–livestock agriculture through improving feed.

Outputs

- A joint strategy and functional forum to enhance the effectiveness of the CGIAR system to address the global research needs of small scale crop-livestock producers.
- Improved cultivars and management practices of food-feed crops with superior grain yield and feed value suitable for the main crop-livestock systems in areas of high rural poverty developed, evaluated and made available through collaborative research with NARS and other partners.
- Synthesis of strategies and management options from the consortium partners for the integrated and sustainable use of land, water, soil nutrients and livestock in mixed crop-livestock systems were rural poverty is high, natural resources are degrading and crop-livestock production systems are intensifying, developed, tested and made available.
- Synthesis of policy and institutional options from the consortium partners to increase productivity of crop-livestock farms and promote market access of small-scale farmers made available to policy/decision makers.
- An internet based resource to share information on the development of sustainable crop-livestock systems made accessible to the general public.

Gains (impact)

This research will provide options to increase the productivity, market opportunities and household livelihoods in small-scale crop-livestock production systems in the poorest regions of Asia, LAC, SSA and WANA. A major impact focus is on improved use of feed resources, particularly through the breeding, dissemination and widespread adoption of improved food-feed crops, that maximize both grain quality and quantity for human food and food value and quantity for livestock feed. These improvements will be conducted within a broader natural resource management context to maintain and enhance system sustainability.

Milestones

2005

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- A strategy to address priority global needs of poor small scale crop-livestock producers revised.
- A framework and model for assessing options to overcome feed scarcity and improve livestock productivity in food-feed systems developed and validated.
- Genetic and environmental/management influences on fodder yield and nutritive quality and their relationship with grain yield established for pearl millet and sorghum.
- At least three superior genotypes and crop management options for sorghum and pearl millet

identified and tested.

- Selection criteria and sources of variation for further improvement identified and available to crop breeders for use in improvement programmes of sorghum and pearl millet
- Strategies and pathways to scale out fodder technologies identified and implemented in Nigeria and India.
- Drivers of intensification of crop-livestock systems identified in case studies conducted in South Asia, Sub-Saharan Africa and Latin America.
- Policy and institutional options to improve the access to markets of small-scale farmers in South Asia and Sub-Saharan Africa synthesized.
- Internet based resource to share information on development options fro crop-livestock systems enhanced.

2006

- Strategies and pathways to scale out fodder technologies identified and implemented in Nigeria and India.
- Genetic and environmental/management influences on fodder yield and nutritive quality and their relationship with grain yield assessed for maize and cowpea.
- At least three superior genotypes and crop management options for maize and cowpea identified and tested.

2007

- SLP strategy to address key priority global needs of poor small scale crop-livestock producers updated.
- Genetic and environmental/management influences on fodder yield and nutritive quality and their relationship with grain/tuber yield assessed for rice, sweet potato, pigeon pea.
- At least three multi-purpose genotypes and management options for cowpea, rice and pigeon pea identified and tested.
- Selection criteria and sources of variation for further improvement identified and available to crop breeders for use in improvement programmes of cowpea, pigeon pea and rice.
- Ex-post impact assessment studies of improved food-feed crops initiated for pearl millet and sorghum.

Users—Farmers, NGOs, NARS, development agencies (public and private).

Collaborators

NARS partners, NGOs and private organizations: NARS of Bangladesh, Cambodia, China, Colombia, Ethiopia, India, Indonesia, Kenya, Mali, Niger, Nigeria, Peru, Philippines, Syria, Thailand, Vietnam, South Africa and Zimbabwe.

CGIAR partners: CIAT, CIMMYT, CIP, ICARDA, ICRAF, ICRISAT, IFPRI, IITA, ILRI, IRRI, IWMI

Cost—US$ 0.7 million from 2005 through 2007

System linkages—Germplasm improvement, sustainable production, policy and enhancing NA

Project 6. CGIAR Systemwide Livestock Programme

Hierarchy of activities/objectives	*Indicators for achievements*	*Assumptions*	*Indicators for Assumptions*
Goal Contribute to the CGIAR goal and Millennium Development Goals through alleviating poverty and enhancing the natural resource assets of small-scale crop-livestock producers.	Numbers and proportion of crop-livestock keepers living under the poverty line in 5 countries in targeted regions (SSA, SA, SEA, WANA, LAC) decrease by 10 % by 2015. Land degradation and nutrient mining arrested and water used efficiency and availability increased in 5 countries in targeted regions by 10% by 2015.	Pro-poor policies and institutions promote rural development and economic growth in countries in targeted regions	World development indicators on poverty and status of natural resources show improvement in at least three countries in targeted regions. Country national plans and reports on poverty reduction indicate success in at least three countries in targeted regions.
Intermediate goals Crop-livestock productivity and income generated from crop-livestock farming increased. The productive capacity of natural resources of mixed crop-livestock producers enhanced. Institutional capacity of developing countries to improve crop-livestock systems enhanced.	Productivity of crop–livestock farms increased by 15 % validated in at least 6 pilot sites in at least three countries situated in regions of high rural poverty by 2010. By 2010 water use and soil nutrient balances indicate no further resource degradation with respect to those in 2005 or earlier and by 2015 they indicate improvement in at least 2 pilot sites in areas of high rural poverty. At least one institution in each of 5 countries in targeted regions has developed organizational and human resources to improve crop-livestock systems.	Trends remain on demand for livestock products in developing countries. Crop-livestock integration continues to be the main path for agricultural intensification in poor countries.	Demand and production for meat and milk in developing countries grow by more than 3 % annually. More than 75% of the growth in ruminant milk and meat production occurs in mixed crop-livestock systems. Most of the monogastric meat production in areas where poor people can contribute to production and/or supply of inputs.
Purpose Through synergies created within the CGIAR system, leveraging resources and adding value to the contribution of individual centers to the CGIAR goal: • NARS and relevant users promote and small-scale crop-livestock producers adopt improved food-feed systems that overcome feed scarcity and increase livestock productivity. • NARS and relevant users promote and small-scale farmers adopt strategies for the sustainable use of land, water and nutrients in crop-livestock systems. • Decision makers, development agents and communities of crop-livestock producers adopt policy and institutional options that improve productivity and sustainability of crop-livestock systems.	At least 6 NARS and other development agencies in at least 3 countries located in different regions of high rural poverty promote demonstrably better food-feed systems than those prevailing in 2005 or earlier in at least 3 key crop-livestock systems. At least of 10% of crop-livestock producers adopt improved food-feed systems and better nutrient management practices in at least 6 pilot sites by 2010. At least 4 NARS and other development agencies in at least 2 countries located in different regions of high rural poverty promote demonstrably better strategies and practices to use land, water and nutrients than those prevailing in 2005 or earlier. At least 4 communities in 2 pilot sites located in different countries adopt community level practices to manage better land and water resources by 2010. Decision makers and local communities in at least 3 countries in different regions adopt policies and institutions that enable the increased in productivity and sustainability of key crop livestock systems by 2010.	NARS involved in rural development are adequately funded and staffed and their organization and function is efficient. Proper and functional alliances of government, non-government and private organizations that promote rural development are set in place.	Funding and support to institutions involved in rural development is adequate in at least three countries in different regions targeted by the Programme

Hierarchy of activities/objectives	*Indicators for achievements*	*Assumptions*	*Indicators for Assumptions*
Outputs *6.1* A joint strategy and functional forum to enhance the effectiveness of the CGIAR system to address the global research needs of small scale crop-livestock producers.	At least 5 new projects involving at least 10 CGIAR centres, responding to a global livestock research strategy and addressing the needs of poor crop-livestock producers in at least 5 countries located in at least three different regions are implemented between 2005 and 2007.	Donor and CGIAR support for the SLP continues	SLP funded at USD 3 M/year through 2007
6.2 Improved cultivars and management practices of food-feed crops with superior grain yield and feed value suitable for the main crop-livestock systems in areas of high rural poverty developed, evaluated and made available through collaborative research with NARS and other partners.	At least six improved genotypes and practices for their better management of at least three key food-feed crops that will increase crop-livestock productivity by at least 10% identified and tested by NARS and other partners by 2007.		
6.3 Synthesis of strategies and management options from the consortium partners for the integrated and sustainable use of land, water, soil nutrients and livestock in mixed crop-livestock systems were rural poverty is high, natural resources are degrading and crop-livestock production systems are intensifying, developed, tested and made available.	At least three alternative community level management options for better use of land and water available to NARS and other partners by 2007.		
6.4 Synthesis of policy and institutional options from the consortium partners to increase productivity of crop-livestock farms and promote market access of small-scale farmers made available to policy/decision makers.	Policy and institutional options to promote productivity gains and enhanced sustainability of small scale crop-livestock farms made available to policy makers and local communities of at least 3 countries by 2007.		
6.5 An internet based resource to share information on the development of sustainable crop-livestock systems made accessible to the general public.	Internet base resource used by the general public increasingly from 2005 (5000 hits) to 2007 (15000 hits).		

Activities	*Milestones*	*Assumptions*	*Indicators*
Assess system research needs, allocate resources to priority areas, monitor and evaluate activities and revise work plans of the Systemwide Livestock Programme in face to face annual meetings and information technology based consultations by the CGIAR inter-centre Livestock Programme Group.	*Assess system research needs* A strategy to address key priority global needs of poor small scale crop-livestock producers available by early 2005 and revised in 2006 and 2007. At least three new research projects addressing the needs of poor small scale crop-livestock in three regions initiated in 2005, at least one project initiated in 2006 and at least one in 2007.	Donor and CGIAR support for the SLP continues Staffing of CGIAR centres members of the SLP and NARS partners participating in the Programme remain stable or increase	SLP funded at USD 3 M/year through 2007. A minimum of four Scientists Year SY) across 5 projects maintained.
Develop a framework and models to identify needs and assess ex-ante the potential impact on poverty of a range of options to improve crop-livestock systems in areas of high rural poverty.	*Develop framework and models* A framework and model for assessing options to overcome feed scarcity and improve livestock productivity in food-feed systems available in 2005, validated with at least two food-feed crops in 2005, two more food-feed crop in 2006 and two additional food-feed crops in 2007.		
Evaluate germplasm and *management practices of main food crops* for their capacity to produce livestock feed of desirable nutritive quality.	*Management practices of main food crops* Genetic and environmental/management influences on fodder yield and nutritive quality and their relationship with grain yield established for two key food-feed crops (millet sorghum) in 2005, two more crops in 2006 (maize, cowpea) and three more (rice, sweet potato, pigeon pea) in 2007. At least three multi-purpose genotypes and management of sorghum and millet tested by smallholder farmers and market agents in benchmark areas in 2005-2007, maize in 2006-2008, cowpea, rice and pigeon pea in 2007-2009. Selection criteria and sources of variation for further improvement identified and available to crop breeders for use in improvement programmes of sorghum and millet by 2005, maize by 2006, cowpea, pigeon pea and rice by 2007.		
Participatory *testing* with farmers and market agents *of improved dual-purpose (food-feed) crops* and delivery systems at benchmark sites	*Testing of improved dual-purpose (food-feed) crops* At least three superior genotypes and management from existing germplasm of sorghum and millet identified and tested by 2005, maize and cowpea by 2006 and rice, and pigeon pea by 2007. Strategies and pathways to scale out fodder technologies in Nigeria and India identified and implemented in Nigeria and India by 2005. Ex-post impact assessment of improved food-feed pearl millet and sorghum initiated by 2007.		
Develop models and evaluate options (herbaceous legumes, nutrient cycling, manure and fertilizer use) *to improve soil fertility* and production of food-feed crops at farm level.	*Develop models to improve soil fertility* A synthesis of nutrient and food-feed crops management options for cereal-cowpea-livestock systems in west Africa available in 2005.		

Activities	*Milestones*	*Assumptions*	*Indicators*
Develop *strategies for the sustainable use of land and water* in crop-livestock systems at watershed and community level. Analyze role of policies and institutions in the intensification of *crop–livestock production systems and smallholder participation* in food/feed markets and disseminate options with relevant users. *Develop user-friendly databases*, decision support systems and documents on options to improve crop–livestock models for dissemination and sharing through internet based resources.	*Strategies for the sustainable use of land and water* A project for better management of water, land and nutrients initiated in 2005, and watershed management options identified by 2007 *Crop–livestock production systems and smallholder participation* Drivers of intensification of crop-livestock systems in case studies conducted in South Asia, Sub-Saharan Africa and Latin America identified and synthesized and book published in 2005. Policy and institutional options to improve the access to markets of small scale farmers in South Asia and Sub-Saharan Africa avail identified and synthesized and book published in 2005. *Develop user-friendly databases* Internet based resource available by early 2005 and updated regularly between 2005 and 2007.		

ILRI Partners

National Partners

Afghanistan Specialist Advisory Committee on Antimicrobial Resistance (SACAR)
Angola Veterinary Research Institute [Instituto de Investigacao Veterinaria] (VRI)
Argentina Cooperative Research Centre for Cattle and Beef Quality
Australia Commonwealth Scientific and Industrial Research Organization (CSIRO)/Cooperative Research Centre for Cattle and Beef Quality
Austria Austrian Research Centers in Seibersdorf (ARC)/Federal Ministry of Finance/Institute of Organic Farming/University of Agriculture/University of Natural Resources & Applied Life Sciences (BOKU)
Belgium Belgian Survival Fund/ Federal Public Service for Trade and Development/Flemish Office for Development Cooperation and Technical Assistance/ Institute of Tropical Medicine (ITM)/ L'universite Catholique de Louvian/European Union - Marie Curie
Benin Unite de Recherche Zootechnique et Veterinaire – Institut National Des Recherche
Bolivia Ministry of Agriculture
Botswana Animal Production Research Unit
Burkina Faso Centre International de Recherche et Developpement Sur L'Elevage en Zone Subhumi (CIRDES)/Direction Provinciale des Ressources Animales (DPRA)/ Programme National de la Gestión de la Terroir (PNGT)
Cambodia National Animal Health & Production Investigation Center (NAHPIC)
Cameroon Institut de Recherche Agricole pour le Developpement (IRAD)/University of Yaoundé
Canada Comart Foundation/Department of Foreign Affairs/Guelph University/University of Saskatchewan
China Asian Vegetables Research and Development Center (AVDRC)/Beijing Genomics Institute/Chinese Academy of Agricultural Sciences – CAAS/ Department of Economics and Technology/ Department of International Cooperation/Ministry of Agriculture/National Animal Husbandry and Veterinary Service/Rural Development Administration/Sichuan Animal Science Academy (SASA)/Sichuan Provincial Bureau of Animal Husbandry and Foodstuff/Yunnan Beef Cattle and Pasture Research Center
Cote d'Ivoire Institut de Recherche Agricole pour le Developpement (IRAD)/Institut National Polytechnique Houphouet Boigny (INPHB)/ Ministry of Higher Education & Research, Abidjan/Service de Lutte Contre la Trypanosomiase Animale et les Vecteurs (SLTAV)
Colombia Corporacion Columbia de Investigacion Agropecaria (CORPOICA)/ Tropical Soil Biology and Fertility Institute of CIAT/University of Tropical Algriculture UTA-TOSOLY
Congo Group D' Etude et De Recherche Sur La Diversite Biologique (GEDRIB)
Costa Rica Consejo Agropecuario Centroamericano (CAC)/ Instituto Inteamericano de Cooperación para la Agricultura (IICA)
Denmark Danish Bilharziasis Laboratory/ Danish Institute of Agricultural Sciences (DIAS) /Royal Veterinary and Agricultural University of Denmark
Egypt Agricultural Research Centre
Ethiopia Ada Liben Wereda/Addis Ababa University/ Adami Tulu Research Centre (ATRC)/Adet Agricultural Research Centre/Agri-Service/Agricultural Research and Training Project (ARTP)/ Alemaya University of Agriculture/Andasa Livestock Research Centre/Areka Agricultural Research Centre/Awassa Agricultural Research Centre (AARC)/Bako Agricultural Research Centre/Debub University/Ethiopia Health and Nutritional Research Institute Regional Authorities/Ethiopian Agricultural Research institute (EARO)/Ethiopian Pastoralist Research and Development Association (EPaRDA)/Ethiopian Rainwater Harvesting Association/Forestry Research Centre (FRC)/Jimrna Agricultural Research Centre (JARC)/Kulumsa Agricultural Research Center/Mekelle Agricultural Research Centre (MARC)/National Animal Health Research Centre (NAHRC)/National Soil Research Centre/National Veterinary Institute/Sheno Agricultural Research Centre (SARC) /Oromia Agricultural research Organization/Sinana Agricultural Research Center/Sirinka Agricultural Research Centre
France Agronomique pour le Developpement/Etudes Pluridisciplinairies pour l'Habitation et Travaux Annexes (EPHTA)/Agropolis/ Institut de Recherche pour le Development (IRD)
International Network for the Improvement of the Banana Plantain (ThJIBP)/Ministere de Ia Jeunesse, de l'Education et de Ia Recherche/ Ministry of Foreign Affairs/Ministere de Ia Researche et de Ia Technologie
Gambia Department of Livestock Services (DLS)/International Trypanotolerance Centre
Germany Collective Action and Property Rights (CAPRi)/ Hohenheim University/Ideennetzerk Wissenchaft und Tecnic (InWEnt)
Ghana Savanna Agricultural Research Institute (SARI)/ Soil Research Institute (SRI)/University of Ghana
Guinea Department National d'Elevage/Institut de Recherche Agronomique de Guinee (DNE/IRAG)
Guatemala Asociacion Gualtemateca de Criadores de Ganado Brahmán y Derivados (ASOBRAHMAN)/Ministerio de Agricultura, Ganadería y Alimentación, Guatemala (MAGA)

Honduras Comité Americano de Remesas al Exterior, Honduras (CARE)/Federación Nacional de Agricultores y Ganaderos de Honduras (FENAGH)/ Secretaria de Agricultura y Ganadería, Honduras (SAG)
India Bharatiya Agro Industries Foundation (BAIF)/Central Arid Research Zone Research Institute (CAZRI)/Central Institute of Brackishwater Aquaculture (CIBA)/Central Institute for Research On Goats (CIRG)/Central Sheep and Wool Research Centre (SHEEPINST)/ Development Research Foundation/Indian Agricultural Research Institute (IARI)/Indian Council of Agricultural Research (ICAR)/Indian Institute of Management(IIM)/ Institute of Rural Management (IRMA)/Indian Veterinary Research institute (IVRI)/ Indira Gandhi National Open University/Khon Kaen University/Izartnagar Angaru Agricultural University/Ministry of Agriculture/ National Academy of Agricultural Research Management/National Centre for Agricultural Economics and Policy Research/National Dairy Research Institute(NDRI)/National Dairy Development Board (NDDB)/National Institute of Agricultural Extension Management/Rural development Trust
Indonesia Agricultural Research and Development Agency/ Animal Science Research Institute/Central Research Institute of Animal Science (CRIAS)/Research Institute for Veterinary Science
Ireland Department of Animal Science/Development Cooperation Ireland/Department of Foreign Affairs
Iran Agricultural Research Organization/Global Forum for Agricultural Research (GFAR)
Israel University of Haifa/ Department of Animal Science
Italy Directorate General for Development Cooperation/Ministero Degli Estri/Ministry of Agriculture/Ministry of Foreign Affairs/University of Florence
Japan Foundation for Advanced Studies on International Development (FASID)/ Hokkaido University/Japan International Cooperation Agency (JICA)/Japanese International Research Centre for Agricultural Sciences (JIRCAS)/ National Graduate Institute for Policy Studies (GRIPS)/
Ministry of Agriculture, Forestry and Fisheries/Ministry of Foreign Affairs/Nagoya City University/ Sasakawa University of Tokyo/Global 2000 Foundation
Jordan National Center for Agricultural Research and Technology Transfer
Kenya African Biotechnology Stakeholders Forums (ABSF)/ ActionAid/African Academy of Sciences/Central Bureau of Statistics/ Biotechnology Trust Africa/Cohort for Research on Environment, Urban Management and Human Settlements/Egerton University/French Institute for Research in Africa/ Harvest Biotech Foundation International/Jomo Kenyatta University of Agriculture and Technology/Kenya Agricultural Research Institute (KARI)/Kenya Dairy Board/Kenya Forestry Research Institute (KEFRI)/Kenya Medical Research Institute (KEMRI)/ Kenya Trypanosomiasis Research Institute (KETRI)/Kenya Wildlife Service (KWS)/Kenyatta University/Ministry of Planning and National Development/Ministry of Livestock and Fisheries Development/National Agricultural Research Laboratories (NARL)/National Animal Husbandry Research Centre (NAHRC)/National Arid Lands Research Programme (NARLC)/ Office of the President/ Plant Resources of Tropical Africa (PROTA)/ The World Conservation Union (IIJCN) — East African Regional Office/National Cereals Produce Board (NCPB)/National Environment Management Institute (NEMA)/National Relief Services/University of Nairobi
Korea, Republic of Research Management Bureau/Rural Development Administration International Technical Cooperation Centre
Kyrgyzstan Center Agrarier Scientific
Laos National Agriculture and Forestry Research Institute (NAFR1)
Luxemburg Ministry of Finance
Mali Direction Nationale de l'Appui Monde Rurale (DNAMR)/Centre Regional de la Recherche Agricole Sikasso (IER/CRRA)/Institut d'Economie Rurale du Mali/Laboratoire Central Veterinaire (LCV)/Unite Centrale de Lutte Contre les Mouches tse-tse et les Trypanosomoses Animales (ULCT)
Malaysia University of Malaysia/Veterinary Research Institute
Malawi Department of Agricultural Research and Technical Services (DARTS)
Mexico National Institute of Forestry, Agricultural & Animal Research (INIFAP)
Morocco National Institute for Agricultural Research
Mozambique Family Sector Livestock Development Programme
Netherlands Centre for Agricultural and Rural Cooperation/ Common Fund for Commodities (CFC)/Directorate General for International Cooperation (DGIC)/Ministry of Development Cooperation/Ministry of Foreign Affairs /Promoting Local Innovation(PROLINNOVA)/The Technical Centre for Agricultural and Rural Cooperation (CTA)/United Nations University-Institute for New Technologies/Wageningen University/Wetenschappelijk Onderzoek van de Tropen en Ontwikkelingslanden (WOTRO)/World Wildlife Foundation (WWF)
Níger L'institut de Recherche Agronomique du Níger (INRAN)
Nigeria Ahmadu Bello University (ABU)/Buachi State Agricultural Development Project (BSADP)/Conmmnity Level Environmental Action Network (CLEAN)/Department of Livestock and Pest Control Services Federal Livestock Department/Federal Ministry of Agriculture/Institute for Agricultural Research (IAR)/Kaduna State Agricultural Development Project (KADP)/Lake Chad Research Institute (LCRI)/Ministry of Utilities/Miyetti Allah (Umbrella Pastoralists Associations)/National Animal Production Research Institute (NAPRI)/National Livestock Projects Division/National Veterinary Research Institute(NRVI)/State Ministries' Veterinary Services Department / National

Livestock Development Project (NLPD)/Pan-African Programme for the Control of Epizootics (PACE)/Smallholder Livestock Producers Associations/University of Maiduguri (UNIMAID)/University of Agriculture/University of Ibadan (UI)/University of Nigeria (UNN)
Norway Agricultural University of Norway's Centre for International Environment and Development Studies (NORAGRIC)/Norwegian Ministry of Foreign Affairs/ University of Norway
Panama Foragro and Fontago Agricultural Research Institute of Panama
Perú Consortium for Sustainable Development of the Andean Ecoregion/Instituto Nacional de Desarrollo/Instituto Nacional de Investigación Agraria
Philippines Bureau of Agricultural Research/Department of Agriculture/ Philippine Council for Agriculture, Forestry and Nature Resources Research and Development (PCARRD)
Poland Warsaw Agricultural University
Qatar Plant Tissue Culture Laboratories
Rwanda Agrotech/Heifer Project International/Institut des Sciences du Rwanda (ISAR)/Kigali Health Institute/Ministry of Agriculture, Livestock & Forests (MALF)/National Veterinary Laboratories, Rubilizi/ Project de developpement des ressources communautaires et des Infrastructures de l'Umutara (PDRCIU)
Saudi Arabia Agriculture and Water Directorate/Gulf Cooperation Council
Sierra Leone National Agricultural Research Coordinating Council
Senegal Institut Senegalise de Recherche Agricoles
Sierra Leone National Agricultural Research Coordinating Council
South Africa Ministry of Agriculture and Land Affairs/Agricultural Research Center
Sweden International Foundation for Science/Royal Swedish Academy of Agriculture and Forestry/Swedish University of Agricultural Science
Switzerland Federal Livestock Department (FLD)/Foundation for Advances Studies in International Development/Swiss Agency for Development and Cooperation (SDC)/Swiss Centre for International Agriculture/Swiss Tropical Institute/Syngenta Foundation
Syrian Arab Republic General Commission for Scientific Agricultural Research
Spain Animal Health Research Centre (CISA-INIA)/Instituto Nacional de Invest. Y Techno. Agraria y Alimentaria/Instituto Nacional de Investigación Agropecuaria (INIA/NIAFRT)
Tanzania Department of Research development (DRD)/Integrated Tick and Tick-borne Disease Control Project (ITTBDCP)/Lake Zone Agricultural Research and Development Institute(LZARDI)/Mara Region Farmers Initiative Project (MARA-FIP)/Ministry of Water and Livestock Development/National Bureau of Statistics/Sokoine University of Agriculture/University of Dar es Salaam/Veterinary Investigation Centre(VIC)
Thailand Asia Pacific Association of Agricultural Research Institutions (APAARI)/ Kasetsart University/Khon Kaen University
Uganda Coordinating Office of the Control of Trypanosomiasis in Uganda (COCTU)/International Federation for Agricultural Producers/James Arwatta Foundation/Livestock Health Research Institute (LIRI)/Makerere University/National Agricultural Research Organization/ Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)/ National Agricultural Research Organization (NARO)/Strategic Initiative on Urban and Peri-urban Agriculture (SIUPA)/ Uganda National Farmers Federation/Ugandan Rainwater Harvesting Association
Ukraine GLID-Agricultural Food Distributors
United Arab Emirates International Center for Biosaline Agriculture (ICBA)
United Kingdom Biotechnology & Biological Sciences Research Council (BBSRC)/Centre for Tropical Veterinary Medicine/Imperial College London, Distance Learning Programme/ Green Ink, Ltd./John Innes Centre/Leeds University The Leverhulme Trust/Moredun Research Institute/Natural Environment Research Council (NERC)/Natural Research International Ltd/ Natural Resources Systems Programme/Overseas Development Institute(ODI)/University College/University of Edinburgh/University of Glasgow/University of Reading/ University of Sussex/University Of Warwick/Wellcome Trust
United States of America African Biotechnology Support Programme (ABSP II)/Cargill Animal Nutrition Colorado State University/Cornell University/Earth Institute at Columbia University/Educational Concerns for Hunger Organization/Emergent Genetics Inc./
Foundation for Advances Studies in International Development/HarvestPlus/ International Consortium for Agricultural Systems Applications (ICASA)/International Fertilizer Development Center (IFDC)/ Kansas State University/Michigan State University/Montana State University/National Aeronautics and Space Administration (NASA)/National Science Foundation (NSF)/Texas A & M University, Dept of Rangeland, Ecology and Management/University of Florida/University of California/University of Princeton/University of Texas Southwestern/University of Utah/ Princeton University/United States Department of Agriculture (USDA)/United States Medical Research Unit/ Western Michigan University/World Resources Institute
Uzbekistan Ministry of Agriculture –Uzbekistan
Vietnam National Institute of Animal Husbandry, Goat and Rabbit Research Center
Zambia Department of Research and Specialized Services

Zimbabwe Henderson Research Station/University of Zimbabwe

Regional/ Ecoregional Organizations

African Highlands Initiative
African Union-International Bureau for Animal Resources (AU/IBAR),
Asia-Pacific Association of Agricultural Research Institutions (APAARI),
Association for Strengthening Agricultural Research in East & Central Africa (ASARECA),
Biotechnology East Africa,
Caribbean Agricultural Research and Development Institute (CARDI)
Challenge Program on Water for Food (CPWF)
Comprehensive Assessment of Water Food and Agriculture (CAWMA)
Consortium for Sustainable Development of the Andean Ecoregion
Desert Margins Program
Empressa Brasileira de Assistencia Tecnica e Extensao Rural (EMBRAPA),
Etudes Pluridisciplinaires pour l'Habitation et Travaux Annexes (EPHTA)
Fonds Français pour l'Environnement Mondial (FFEM)
Forum for Agricultural Research in Africa (FARA)
Institute of Policy Analysis and Research (IPAR)
Intermediate Technology Development Group (ITDG)
International Network for the Improvement of the Banana Plantain
New Partnership for Africa's Development (NEPAD)
Regional Fund for Agricultural Technology (FONTAGRO)
Rice-Wheat Consortium (RWC)
Strategic Initiative on Urban and Peri-Urban Agriculture (SIUPA)
Strengthening Informal Centre Training and Enterprises (SITE)

CGIAR Centres

Center for International Forestry Research (CIFOR)
Centro Internacional de Mejoramiento de maize y Trigo/ International Maize and Wheat Development Centre (CIMMYT)
Centro International de a Papa (CIP)
Centro International de Agricultura Tropical (CIAT)
International Bank for Reconstruction and Development (IBRD)
International Center for Living Aquatic Research Management (ICLARM)
International Centre for Agricultural Research in the Dry Areas (ICARDA)
International Centre for Research in Agroforestry (ICRAF)
International Crop Research Institute for the Semi Arid Tropics (ICRISAT)
International Food Policy Research Institute (IFPRI)
International Food Policy Research Institute (IFPRI)
International Foundation for Art Research (IFAR) of the CGIAR
International Institute of Tropical Agriculture (IITA)
International Plant Genetic Resources Institute (IPGRI)
International Rice Research Institute (IRRI)
International Service for National Agricultural Research (ISNAR)
International Water Management Institute (IMWI)
International Water Management Institute (IWMI)
West Africa Rice Development Association (WARDA)

International Organizations

African Development Bank
Asian Development Bank (AsDB)
Australian Centre for International Agricultural Research (ACIAR)
Bundesministerium fur Wirtschaftliche Zusammenarbeit und Entwicklung (BMZ)
Care International
Canadian International Development Agency (CIDA)

Centre de Cooperation Internationale en Recherche Agronomique pour le Developpement, France (CIRAD Service Comptamble)
Centre International de Recherche et Developpement Sur L'Elevage en Zone Subhumi
Danish International Development Assistance (DANIDA)
Department for International Development (DFID)
Department for International Development Cooperation (FINNIDA)
Deutsche Gesellschaft fur Technische Zusanimeribaeit (GTZ)
Directorate General for International Cooperation (DGIC)
European Union (EU)
Food and Agricultural Organization of the United Nations (FAO)
Ford Foundation
Interim Science Council/Standing Panel on Impact Assessment (iSc/SPIA)
International Atomic Energy Agency (IAEA)
International Center of Insect Physiology & Ecology (ICIPE)
International Development Research Centre (IDRC)
International Fund for Agricultural Development (IFAD)
International Planned Parenthood Federation
Organization of Petroleum Exporting Countries (OPEC)
Rockefeller Foundation
Swedish International Development Cooperation Agency (SIDA)
United Nations Development Programme (UNDP)
United Nations Environment Programme (UNEP)
United Nations Habitat
United Nations Scientific, Educational and Cultural Organization (UNESCO)
United States Agency for International Development (USAID)
Veterinaries sans Frontieres
Winrock International
World Bank

Private Sector

Agroconsult Ltd, Uganda
African Breeders Service/Total Care Management (ABS/TCM), Kenya
Agip Oil Company, Nigeria
ANTHRA, India
BAIF Development Research Foundation, India
Bayer East Africa Ltd, Kenya
Canadian Air and Waste Management Association (CAWMA), Canada
CARE - Peru
Cargill Animal Nutrition, USA
Cooper Kenya Ltd, Kenya
Greentowns, Kenya
HighChem Veterinary Ltd, Kenya
Land O'Lakes International Development, Kenya
Pfizer, United Kingdom
Rural Development Trust, India
Scanagri, Denmark
VetAgro East Africa, Kenya
VetAgro, Tanzania

Non-governmental organizations

ActionAid, Kenya
CALPI, India
CARE-Ethiopia
Crawford Fund, Australia
Farm Africa, Kenya
Heifer Project International, USA
International Planned Parenthood Federation, United Kingdom
Justice, Development and Peace Commission (JDPC), Nigeria
Salem Village, Ethiopia
SIDE, Costa Rica

Strengthening Informal Sector Training and Enterprises (SITE), Kenya
The Ethiopian Rainwater Harvesting Association, Ethiopia
The Ugandan Rainwater Harvesting Association, Uganda
Vétérinaires sans Frontière-Germany
Veterinaires sans Frontieres-Belgium
Vétérinaires sans Frontière-Switzerland

Abbreviations and acronyms

AARNET	Animal Agriculture Research Network
AATF	African Agricultural Technology Foundation
ABS	American Breeding Services
AfDB	African Development Bank
AGA	Animal Agriculture
AHI	African Highlands Initiative
AI	Artificial Insemination
AIDS	Acquired Immune Deficiency Syndrome
ALIVE	African Livestock
AMREF	African Medical Research Institute
AnGR	Animal Genetic Resources
APAARI	Asia-Pacific Association of Agricultural Research Institution
ARIs	Advanced Research Institutes
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
AU-IBAR	African Union – Inter-African Bureau for Animal Resources
CAMWA	Comprehensive Assessment of Water Food and Agriculture
CAPRi	Collective Action and Property Rights
CARE	Comité Americano de Remesas al Exterior, Honduras
CASREN	Crop – Animal System Research Network
CBPP	Contagious bovine pleuropneumonia
CFC	Common Fund for Commodities
CGIAR	Consultative Group on International Agriculture
CGS	Competitive Grant System
CIAT	Centro Internacional de Agricultura Tropical
CIDA	Canadian International Development Agency
CIFOR	Centre for International Forestry Research
CILSS	Comité Permanent Inter. Etats de Lutte Contre la Secheresse dans le Sahel
CIM	Centre for International Migration
CIP	Centro Internacional de la Papa
CIRDES	Centre Internacional de Recherche – Developpement sur l'Elevage en Zone Subhumide
CORAF	Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricole
CP	Challenge Program
CPWF	Challenge Program on Water for Food
CIMMYT	Centro Internacional de Majoramiento de Maize y Trigo (International Maize and Wheat Development Centre)
DAGRIS	Domestic Animal Genetic Resources Information System
DANIDA	Danish International Development Assistance
DDG-R	Deputy Director General – Research
DFID	United Kingdom Department for International Development
EARO	Ethiopian Agricultural Research Organization
ECAPAPA	Eastern and Central Africa Programme for Agricultural Policy Analysis
ECF	East Coast fever
EDF	European Development Fund
ELISA	Enzyme – Linked Immunosorbent Assay
EPHTA	Etudes Pluridisciplinaires pour l'Habitation et Travaux Annexes (EPHTA)
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FARA	Forum for Agricultural Research in Africa
FFS	Farmers Field Schools
FITCA	Farming In Tsetse Controlled Areas
FMD	Foot-and-mouth disease
GEF	Global Environmental Facility
GIS	Geographical Information System
GTZ	Deutsche Gesellschauft fur Technische Zusanimenbaeit
HIV	Human Immunodeficiency Virus
IARC	International Agricultural Research Centres
ICARDA	International Centre for Agricultural Research in the Dry Areas

ICIPE	International Centre for Insect Physiology and Ecology
ICPTV	Integrated Control of Pathogenic Trypanosomes and Their Vectors
ICRAF	International Centre for Research in Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
INRM	Integrated Natural Resource Management
IPGRI	International Plant Genetic Research Institute
IRRI	International Rice Research Institute
ISAAA	International Service for the Acquisition of Agricultural Biotechnology Applications
ISNAR	International Service for National Agricultural Research
ITC	International Trypanotolerance Centre
ITDG	Intermediate Technology Development Group (ITDG)
ITM	Infection and Treatment Method
ITTBDCP	Integrated Tick and Tick-Borne Disease Control Project
IWMI	International Water Management Institute
KARI	Kenya Agricultural Research Institute
KETRI	Kenya Trypanosomiasis Research Institute
KIPPRA	Kenya Institute for Public Policy Research
KWS	Kenya Wildlife Service
LAC	Latin America and the Caribbean
LEAD	Livestock Environment and Development
LPG	Livestock Programme Group
LPP	Livestock Production Programme
LUCID	Land Use Change, Impacts and Dynamics
MDG	Millennium Development Goals
MoA	Ministry of Agriculture
MoARD	Ministry of Agriculture and Development
MOU	Memorandum of Understanding
MTP	Medium Term Plan
NARES	National agricultural research and extension systems
NARS	National agricultural Research Systems
NASA	National Aeronautics and Space Administration
NePAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
NRI (UK)	Natural Resources Institute – United Kingdom
OECD	Organization for Economic Cooperation and Development
OIE	Office International de Epizootes
PAAT	Programme Against African Trypanosomiasis
PLS	Pilot Learning Sites
PPLPI	Pro–Poor Livestock Policy Initiative
PROCORDE	Programme Concerte de Recherche – Developpement sur l'Elevage e Afrique de l'Ouest
PROLINNOVA	Promoting Local Innovation
QTL	Qualitative Trait Loci
R & D	Research and Development
RWC	Rice-Wheat Consortium
SADC	Southern African Development Community
SDP	Smallholder Dairy Project
SGRP	System Wide Genetic Resource Program
SIDA	Swedish International Development Cooperation
SIMA	System wide Initiative on Malaria and Agriculture
SITE	Strengthening Informal Centre Training and Enterprises
SIUPA	Strategic Initiative on Urban and peri-urban Agriculture
SLP	System-wide Livestock Programmes
SPS	Sanitary and Phyto-Sanitary
SRO	Señor Research Officers
SSA	Sub Saharan Africa
SW/ERP	System Wide and Ecoregional Programmes

UK	United Kingdom
UNU-INTECH	Institute for New Technologies (United Nations University)
USA	United States of America
USAID	United States Agency for International Development
VASAT	Virtual Academy for the Semi Arid Tropics
VSF-B	Veterinaires Sans Frontieres Belgique
WANA	West Asia & North Africa
WB	World Bank
WWS	World Wide Sires

Annex II. Financial Tables

Table 1. ILRI -- Research Agenda Requirements, by Output [1/], 2005

(expenditure in $ million)

Center Themes	Germplasm Improvement	Germplasm Collection	Sustainable Production	Policy	Enhancing NARS	THEMES TOTALS
Project 1 Targeting opportunities			2.1	0.3	0.2	**2.6**
Project 2 Enabling Innovation			2.7	1.0	1.6	**5.3**
Project 3 Markets opportunities			2.1	1.7	0.4	**4.2**
Project 4 Biotechnology	1.4	1.4	10.5	0.3	0.4	**14.0**
Project 5 People, Livestock and the environment	1.7	1.4	3.5	0.0	0.3	**6.9**
Project 6 System-wide livestock program	0.2	0.0	0.4	0.1	0.0	**0.7**
UNDERTAKING TOTALS	**3.3**	**2.8**	**21.3**	**3.4**	**2.9**	**33.7**

Note: This table is required only in the Research Agenda proposal submission (March).

[1/] Please refer to Table 2 for the crosswalk between the CGIAR Activities and the new CGIAR Outputs.

Table 2. ILRI RESEARCH AGENDA - ALLOCATION OF RESOURCES, 2003-2007
(expenditure in $ million)

Allocation of Resources by Outputs
Logical Framework Format

Outputs:	2003 (actual)	2004 (estimate)	2005 (proposal)	2006 (plan)	2007 (plan)
Germplasm Improvement *(Activity: Germplasm Enhancement & Breeding, plus Networks, as appropriate)*	**2.1**	**2.8**	**3.3**	**3.4**	**3.5**
Germplasm Collection *(Activity: Saving Biodiversity, plus Networks, as appropriate)*	**2.0**	**2.3**	**2.8**	**2.9**	**3.0**
Sustainable Production *(Activity: Production Systems Dev & Mgmt, Protecting the Environment plus Networks, as appropriate)*	**19.3**	**19.9**	**21.3**	**22.1**	**22.9**
Policy *(Activity: Improving Policies) plus Networks, as appropriate)*	**3.7**	**3.6**	**3.4**	**3.6**	**3.7**
Enhancing NARS *(Activity: Strengthening NARS - the three sub-activities, plus Networks, as appropriate)*	**3.1**	**2.8**	**2.9**	**3.0**	**3.2**
TOTAL	**30.2**	**31.4**	**33.7**	**35.0**	**36.3**

Allocation of Resources by CGIAR Activity

	2003 (actual)	2004 (estimate)	2005 (proposal)	2006 (plan)	2007 (plan)
Increasing Productivity	**19.5**	**19.8**	**21.1**	**21.9**	**22.7**
of which:					
Germplasm Enhancement & Breeding	2.1	2.8	3.3	3.4	3.5
Production Systems Development & Management	17.4	17.0	17.8	18.5	19.2
Protecting the Environment	**1.9**	**2.9**	**3.5**	**3.6**	**3.7**
Saving Biodiversity	**2.0**	**2.3**	**2.8**	**2.9**	**3.0**
Improving Policies	**3.7**	**3.6**	**3.4**	**3.6**	**3.7**
Strengthening NARS	**3.1**	**2.8**	**2.9**	**3.0**	**3.2**
of which:					
Training and Professional Development	1.3	1.1	1.2	1.2	1.3
Documentation / Information	1.0	0.9	0.9	1.0	1.0
Organization & Management					
Networks	0.8	0.8	0.8	0.8	0.9
TOTAL	**30.2**	**31.4**	**33.7**	**35.0**	**36.3**

Table 3. ILRI RESEARCH AGENDA PROJECT & OUTPUT COST SUMMARY, 2003-2007

(in $ million)

	2003 (actual)	2004 (est)	2005 (proposal)	2006 (plan) 1/	2007 (plan) 1/
Project 1 Targeting opportunites	3.8	3.5	2.6	2.7	2.8
Project 2 Enabling Innovation	6.2	4.6	5.3	5.5	5.7
Project 3 Market opportunities	4.6	5.0	4.2	4.4	4.5
Project 4 Biotechnology	11.4	11.4	14.0	14.6	15.1
Project 5 People, Livestock and the environment	3.9	5.9	6.9	7.2	7.5
Project 6 System-wide livestock programme	0.3	1.0	0.7	0.6	0.7
Total	**30.2**	**31.4**	**33.7**	**35.0**	**36.3**

Summary by Undertaking:	2003 (actual)	2004 (est)	2005 (proposal)	2006 (plan)	2007 (plan)
Germplasm Improvement	**2.1**	**2.8**	**3.3**	**3.4**	**3.5**
Germplasm Collection	**2.0**	**2.3**	**2.8**	**2.9**	**3.0**
Sustainable Production	**19.3**	**19.9**	**21.3**	**22.1**	**22.9**
Policy	**3.7**	**3.6**	**3.4**	**3.6**	**3.7**
Enhancing NARS	**3.1**	**2.8**	**2.9**	**3.0**	**3.2**
Total	**30.2**	**31.4**	**33.7**	**35.0**	**36.3**

Institutional Cost Components:	2003 (actual)	2004 (est)	2005 (proposal)	2006 (plan)	2007 (plan)
Direct Project Costs	**24.8**	**25.7**	**27.8**	**29.2**	**30.7**
Indirect Project Costs (Overhead)	**5.4**	**5.7**	**5.9**	**5.8**	**5.6**
Total Project Costs	**30.2**	**31.4**	**33.7**	**35.0**	**36.3**

1/ This column is not required for the Financing Plan Submission (September).

Table 4. ILRI Allocation of Theme Costs to CGIAR Outputs, 2003-2007

(in $ million)

Project	Activity	2003 (actual)	2004 (est)	2005 (proposal)	2006 (plan) 1/	2007 (plan) 1/
Project 1 Targeting Opportunities	Germplasm Improvement (crops, etc)					
	Germplasm Collection					
	Sustainable Production (crops, etc)	3.2	2.9	2.1	2.2	2.3
	Policy	0.4	0.4	0.3	0.3	0.3
	Enhancing NARS (training, etc)	0.2	0.2	0.2	0.2	0.2
Project 2 Enabling Innovation	Germplasm Improvement (crops, etc)					
	Germplasm Collection					
	Sustainable Production (crops, etc)	3.1	2.3	2.7	2.8	2.9
	Policy	1.2	0.9	1.0	1.1	1.2
	Enhancing NARS (training, etc)	1.9	1.4	1.6	1.6	1.6
Project 3 Market opportunities	Germplasm Improvement (crops, etc)					
	Germplasm Collection					
	Sustainable Production (crops, etc)	2.3	2.5	2.1	2.2	2.3
	Policy	1.8	2.0	1.7	1.8	1.8
	Enhancing NARS (training, etc)	0.5	0.5	0.4	0.4	0.5
Project 4 Biotechnology	Germplasm Improvement (crops, etc)	1.1	1.1	1.4	1.5	1.5
	Germplasm Collection	1.2	1.1	1.4	1.5	1.5
	Sustainable Production (crops, etc)	8.6	8.6	10.5	10.9	11.3
	Policy	0.2	0.2	0.3	0.3	0.3
	Enhancing NARS (training, etc)	0.3	0.4	0.4	0.4	0.4
Project 5 People, Livestock and the environmen	Germplasm Improvement (crops, etc)	1.0	1.5	1.7	1.8	1.9
	Germplasm Collection	0.8	1.2	1.4	1.4	1.5
	Sustainable Production (crops, etc)	1.9	2.9	3.5	3.6	3.7
	Policy					
	Enhancing NARS (training, etc)	0.2	0.3	0.3	0.4	0.4
Project 6 System-wide livestock program	Germplasm Improvement (crops, etc)	0.0	0.2	0.2	0.1	0.1
	Germplasm Collection					
	Sustainable Production (crops, etc)	0.2	0.7	0.4	0.4	0.4
	Policy	0.1	0.1	0.1	0.1	0.1
	Enhancing NARS (training, etc)	0.0	0.0	0.0	0.0	0.1

Summary by Undertaking:

	2003 (actual)	2004 (est)	2005 (proposal)	2006 (plan)	2007 (plan)
Germplasm Improvement	**2.1**	**2.8**	**3.3**	**3.4**	**3.5**
Germplasm Collection	**2.0**	**2.3**	**2.8**	**2.9**	**3.0**
Sustainable Production	**19.3**	**19.9**	**21.3**	**22.1**	**22.9**
Policy	**3.7**	**3.6**	**3.4**	**3.6**	**3.7**
Enhancing NARS	**3.1**	**2.8**	**2.9**	**3.0**	**3.2**
Total:	**30.2**	**31.4**	**33.7**	**35.0**	**36.3**

1/ This column is not required for the Financing Plan Submission (September).

Table 5. ILRI RESEARCH AGENDA, 2003-2007

Investments by Sector, Commodity, and Region (in $ million)

PRODUCTION SECTORS & COMMODITIES	2003 (actual)	2004 (est)	2005 (proposal)	2006 (plan)	2007 (plan)
1/ ***Germplasm Improvement***					
Crops					
Commodity A					
Commodity B					
Commodity C					
Commodity D					
Livestock	2.1	2.8	3.3	3.4	3.5
Trees					
Fish					
TOTAL					
2/ ***Sustainable Production***					
Crops					
Commodity A					
Commodity B					
Commodity C					
Commodity D					
Livestock	28.1	28.6	30.4	31.6	32.8
Trees					
Fish					
TOTAL					
3/ ***Total Research Agenda***					
Crops					
Commodity A					
Commodity B					
Commodity C					
Commodity D					
Livestock	30.2	31.4	33.7	35.0	36.3
Trees					
Fish					
TOTAL	**30.2**	**31.4**	**33.7**	**35.0**	**36.3**

4/ **Regional**	2003 (actual)	2004 (est)	2005 (proposal)	2006 (plan)	2007 (plan)
Sub-Saharan Africa (SSA)	**21.8**	**22.6**	**22.3**	**23.1**	**23.6**
Asia	**7.2**	**7.4**	**9.4**	**9.8**	**10.5**
Latin American and the Caribbean (LAC)	**0.9**	**1.0**	**1.3**	**1.4**	**1.5**
West Asia and North Africa (WANA)	**0.3**	**0.4**	**0.7**	**0.7**	**0.7**
TOTAL	**30.2**	**31.4**	**33.7**	**35.0**	**36.3**

1/ This column is not required for the Financing Plan Submission (September).

2/ Includes overheads, and must add up to the sum of the individual sectors/commodities from the project portfolio.

3/ Equals the sum of sectors/commmodities in Increasing Productivity, scaled up to total investments for the Research Agenda.

4/ The regional allocation is compiled on basis of spending on research that is relevant to a region irrrespective of the geographical area of actual expenditure

Table 6. ILRI RESEARCH AGENDA, 2003-2007

Expenditure by Functional Category, and Capital Investments (in $ million)

OBJECT OF EXPENDITURE	2003 (actual)	2004 (est)	2005 (proposal)	2006 (plan) 1/	2007 (plan) 1/
Personnel	13.8	13.2	13.5	13.8	14.0
Supplies and Services	12.9	14.4	16.1	17.0	17.9
Operational Travel	1.3	1.4	1.5	1.5	1.6
Depreciation	2.2	2.4	2.6	2.7	2.8
TOTAL	**30.2**	**31.4**	**33.7**	**35.0**	**36.3**
CAPITAL INVESTMENTS	**2003 (actual)**	**2004 (est)**	**2005 (proposal)**	**2006 (plan)**	**2007 (plan)**
Physical Facilities					
Research	0.1	0.1	0.0	0.0	0.0
Training					
Administration					
Housing					
Auxiliary Units					
sub-total	**0.1**	**0.1**	**0.0**	**0.0**	**0.0**
Infrastructure & Leasehold	**0.0**	**0.0**	**0.2**	**0.2**	**0.2**
Furnishing & Equipment					
Farming	0.01	0.01	0.02	0.05	0.05
Laboratory & Scientific	0.08	0.20	0.30	0.50	0.70
Office	0.11	0.01	0.15	0.10	0.10
Housing	0.02	0.02	0.04	0.04	0.04
Auxiliary Units	0.00	0.00	0.00	0.04	0.04
Computers	0.33	0.20	0.45	0.50	0.50
Vehicles	0.12	0.10	0.10	0.20	0.25
Aircraft					
sub-total	**0.7**	**0.5**	**1.1**	**1.4**	**1.7**
TOTAL	**0.8**	**0.6**	**1.3**	**1.6**	**1.9**
CAPITAL FUND CASH RECONCILIATION	**2003 (actual)**	**2003 (est)**	**2004 (proposal)**	**2005 (plan)**	**2007 (plan)**
Balance, January 1	5.9	7.3	9.1	10.4	11.5
plus: annual depreciation charge	2.2	2.4	2.6	2.7	2.8
plus / minus: disposal gains/(losses)					
plus / minus: other					
minus: asset acquisition costs	-0.8	-0.6	-1.3	-1.6	-1.9
equals: Balance, December 31	**7.3**	**9.1**	**10.4**	**11.5**	**12.4**

1/ This column is not required for the Financing Plan Submission (September).

Improved policy analyses and techniques for policy formulation and public management are accessible to NARS,

Table 7. ILRI AGENDA FINANCING & SUMMARY STATEMENT OF ACTIVITY, 2003-2005
(in $ Thousands)

Member	2003 (actual) 1/		2004 (estimate) 2/		2005 (proposal) 3/	
Unrestricted Grants	**(US$)**	**(national currency)**	**(US$)**	**(national currency)**	**(US$)**	**(national currency)**
AUSTRALIA	197		158		176	
BRAZIL					9	
BELGIUM	182		159			
CANADA /4	1,600		1,518		1,496	
CHINA	50		30		50	
DENMARK	604		714		769	
FINLAND	416		358		369	
GERMANY	298		219		176	
INDIA	38		37		37	
IRELAND	705		642		770	
ITALY	395		439		451	
JAPAN	198		165		170	
KOREA	50		50		50	
NETHERLANDS	296		289		297	
NORWAY	1,248		1,125		1,216	
SWEDEN	947		909		713	
SWITZERLAND	952		963		897	
UNITED KINGDOM					1,188	
USA	2,800		2,800		2,800	
WORLDBANK	1,750		1,500		1,500	
subtotal	**12,726**		**12,075**		**13,134**	

Restricted Grants	**2003 (actual)**		**2004 (est)**		**2005 (proposal)**	
	(US$)	**(national currency)**	**(US$)**	**(national currency)**	**(US$)**	**(national currency)**
ADB	442		257			
ASARECA/EU			449		473	
AGIP	16					
AUSTRALIA	126		15		74	
AUSTRIA	3		97		200	
BELGIUM	402		607		430	
CANADA	124		3,381		8,833	
CAPRi	38					
CFC	374		1,172		1,000	
COMART FOUNDATION	38		38		64	
DENMARK	251		366		137	
EU	1,997		1,344		1,561	
ETHIOPIA	17		13		33	
FRANCE	1,512		811		792	
FINLAND	22					
FAO/TCP	205		176		40	
FASID	45					
GEF	451				186	
GERMANY	702		515		732	
IDRC	132		251		176	
IFAD	693		784		493	
ITALY	67		195		236	
IRELAND	76		82		100	
JAPAN	210		180		160	
KENYA	221					
KOREA	31		50		60	
LAND O'LAKES			65		214	
LUXEMBOURG						
LEVERHULME TRUST						
MAKERERE UNIVERSITY	22		17			
NETHERLANDS	332		387		320	
NEPAD/CIDA						
NORWAY			250			
OADB	5					
AU/IBAR	365		338			
OPEC	17		25			
OTHERS	428		272		273	
PHILIPPINES					35	
ROCKFELLER FOUNDATION	310		258		110	
SASAKAWA GLOBAL			21			
SPAIN	130		150		150	
SWEDEN	25		8		9	
SWITZERLAND	212		363		363	
SOUTH AFRICA	50		50		50	
UNEP			372			
UNNCD	20					
UNITED KINGDOM	4,246		3,287		725	
USA	654		678		566	
UNIVERSITY OF FLORIDA	10		27		30	
UNIVERSITY OF NOTTINGHAM	111		15			
WELLCOME TRUST	224		285		200	
WORLDBANK	583		605		595	
WOTRO	9					
WHO						
WWF	1					
subtotal	**15,949**		**18,256**		**19,420**	
TOTAL GRANTS	**28,675**		**30,331**		**32,554**	

Summary Statement of Activity	**2003 (actual)**		**2004 (estimate)**		**2005 (proposal)**	
Member Grants	**28,675**		**30,331**		**32,554**	
+ Center Income (other revenues)	**1,646**		**1,100**		**1,100**	
= Total Revenues	**30,321**		**31,431**		**33,654**	
Less:						
Total Expenses	**30,215**		**31,431**		**33,654**	
Surplus (Deficit) of total revenues over total expenses	**106**		**0**		**0**	

1/ This column to be completed only in the Research Agenda submission (March)
2/ This column to be completed in both the Agenda and Financing Plan submissions.
3/ This column to be completed only in the Financing Plan submission (September)

Table 8a ILRI ALLOCATION OF MEMBER FINANCING TO PROJECTS BY OUTPUT- 2003

(in $ million)

			Outputs					
			Germplasm	Germplasm	Sustainable		Enhancing NARS	
Project	**Member**	**Total**	**Improvement**	**Collection**	**Production**	**Policy**	**Training**	**Other**
Project 1								
Targeting Opportunities								
	AU/IBAR	**0.30**			0.26	0.03	0.01	0.00
	FAO	**0.15**			0.13	0.02	0.00	0.00
	Finland	**0.02**			0.02	0.00	0.00	0.00
	France	**0.31**			0.26	0.03	0.01	0.01
	GEF	**0.12**			0.10	0.01	0.00	0.01
	Germany	**0.05**			0.04	0.01	0.00	0.00
	Japan	**0.01**			0.01	0.00	0.00	0.00
	Kenya	**0.01**			0.01	0.00	0.00	0.00
	Netherlands	**0.15**			0.13	0.02	0.00	0.00
	Others	**0.11**			0.09	0.02	0.00	0.00
	Rockefeller	**0.10**			0.09	0.01	0.00	0.00
	South Africa	**0.03**			0.03	0.00	0.00	0.00
	United Kingdom	**0.24**			0.20	0.02	0.01	0.01
	University of Florida	**0.01**			0.01	0.00	0.00	0.00
	USA	**0.13**			0.11	0.02	0.00	0.00
	Worldbank	**0.10**			0.09	0.01	0.00	0.00
	Unrestricted+center inc.	**1.96**			1.62	0.20	0.07	0.07
	Total Project	**3.80**			**3.20**	**0.40**	**0.10**	**0.10**
Project 2								
Enabling Innovation	AsDB	**0.44**			0.22	0.08	0.07	0.07
	Australia	**0.11**			0.06	0.01	0.02	0.02
	Comart Foundation	**0.04**			0.02	0.00	0.01	0.01
	EU	**0.57**			0.29	0.10	0.09	0.09
	Germany	**0.41**			0.21	0.08	0.06	0.06
	IAEA	**0.02**			0.01	0.00	0.01	0.00
	IDRC	**0.13**			0.07	0.03	0.01	0.02
	IFAD	**0.69**			0.35	0.14	0.10	0.10
	Kenya	**0.02**			0.01	0.00	0.01	0.00
	Netherlands	**0.04**			0.02	0.01	0.00	0.01
	Others	**0.06**			0.03	0.01	0.01	0.01
	Rockefeller	**0.05**			0.03	0.01	0.01	0.00
	United Kingdom	**0.05**			0.02	0.01	0.01	0.01
	USA	**0.17**			0.08	0.03	0.03	0.03
	Worldbank	**0.10**			0.05	0.02	0.01	0.02
	Unrestricted+center inc.	**3.30**			1.63	0.67	0.50	0.50
	Total Project	**6.20**			**3.10**	**1.20**	**0.95**	**0.95**
Project 3								
Market Opportunities	CFC	**0.37**			0.19	0.14	0.02	0.02
	Denmark	**0.05**			0.03	0.02	0.00	0.00
	FAO	**0.06**			0.03	0.02	0.01	0.00
	FAS	**0.05**			0.03	0.02	0.00	0.00
	France	**0.42**			0.21	0.17	0.02	0.02
	Germany	**0.07**			0.04	0.03	0.00	0.00
	Italy	**0.07**			0.04	0.03	0.00	0.00
	Kenya	**0.03**			0.02	0.01	0.00	0.00
	Land O'lakes	**0.06**			0.03	0.02	0.01	0.00
	Netherlands	**0.07**			0.04	0.03	0.00	0.00
	Others	**0.05**			0.03	0.02	0.00	0.00
	Rockefeller	**0.05**			0.03	0.02	0.00	0.00
	South Africa	**0.02**			0.01	0.01	0.00	0.00
	Spain	**0.13**			0.07	0.04	0.01	0.01
	Switzerland	**0.02**			0.01	0.01	0.00	0.00
	United Kingdom	**0.75**			0.38	0.29	0.04	0.04
	Worldbank	**0.14**			0.07	0.05	0.01	0.01
	Unrestricted+center inc.	**2.19**			1.04	0.87	0.13	0.15
	Total Project	**4.60**			**2.30**	**1.80**	**0.25**	**0.25**
Project 4								
Biotechnology	AU/IBAR	**0.11**	0.01	0.01	0.08	0.00	0.00	0.01
	Austria	**0.01**	0.00	0.00	0.01	0.00	0.00	0.00
	Belgium	**0.40**	0.04	0.04	0.30	0.00	0.01	0.01
	Ethiopia	**0.01**	0.00	0.00	0.01	0.00	0.00	0.00
	EU	**0.93**	0.09	0.09	0.70	0.02	0.02	0.01
	France	**0.78**	0.08	0.08	0.58	0.02	0.01	0.01
	GEF	**0.34**	0.03	0.03	0.25	0.01	0.01	0.01
	Germany	**0.06**	0.01	0.01	0.04	0.00	0.00	0.00
	Ireland	**0.08**	0.01	0.01	0.06	0.00	0.00	0.00
	Japan	**0.21**	0.02	0.02	0.16	0.00	0.01	0.00
	Kenya	**0.11**	0.01	0.01	0.08	0.00	0.01	0.00
	Korea	**0.03**	0.00	0.00	0.02	0.00	0.00	0.01
	Oromia A. D Bureau	**0.01**	0.00	0.00	0.01	0.00	0.00	0.00
	Others	**0.09**	0.01	0.01	0.07	0.00	0.00	0.00
	Rockefeller	**0.06**	0.01	0.01	0.04	0.00	0.00	0.00
	Sasakawa Foundation	**0.01**	0.00	0.00	0.01	0.00	0.00	0.00
	Sweden	**0.03**	0.00	0.00	0.02	0.00	0.00	0.01
	United Kingdom	**2.47**	0.25	0.25	1.84	0.05	0.04	0.04
	Wellcome	**0.34**	0.03	0.03	0.26	0.00	0.01	0.01
	Worldbank	**0.10**	0.01	0.01	0.08	0.00	0.00	0.00
	WOTRO	**0.01**	0.00	0.00	0.01	0.00	0.00	0.00
	Unrestricted+center inc.	**5.21**	0.49	0.59	3.97	0.10	0.03	0.03
	Total Project	**11.40**	**1.10**	**1.20**	**8.60**	**0.20**	**0.15**	**0.15**
Project 5								
People, Livestock and the								
environment	Agip	**0.02**	0.01	0.00	0.01		0.00	0.00
	Australia	**0.02**	0.01	0.00	0.01		0.00	0.00
	Denmark	**0.20**	0.05	0.04	0.09		0.01	0.01
	EU	**0.39**	0.10	0.08	0.19		0.01	0.01
	Germany	**0.11**	0.03	0.02	0.06		0.00	0.00
	IDRC	**0.01**	0.00	0.00	0.01		0.00	0.00
	Netherlands	**0.07**	0.02	0.01	0.04		0.00	0.00
	Others	**0.22**	0.06	0.04	0.10		0.01	0.01
	Rockefeller	**0.05**	0.01	0.01	0.03		0.00	0.00
	United Kingdom	**0.72**	0.18	0.14	0.36		0.02	0.02
	USA	**0.34**	0.09	0.07	0.16		0.01	0.01
	Worldbank	**0.13**	0.03	0.03	0.07		0.00	0.00
	Unrestricted+center inc.	**1.62**	0.41	0.36	0.77		0.04	0.04
	Total Project	**3.90**	**1.00**	**0.80**	**1.90**		**0.10**	**0.10**
Project 6								
Sytem-wide livestock programme								
	Canada	**0.12**	0.00		0.08	0.04	0.00	0.00
	Switzerland	**0.18**	0.00		0.12	0.06	0.00	0.00
	Total Project	**0.30**	**0.00**		**0.20**	**0.10**	**0.00**	**0.00**

Center Totals		Germplasm	Germplasm	Sustainable		Enhancing NARS	
	Total	**Improvement**	**Collection**	**Production**	**Policy**	**Training**	**Other**
Total Targeted Funding	**15.9**	**1.2**	**1.0**	**10.3**	**1.9**	**0.8**	**0.7**
Total Unrestricted Funding	**12.7**	**0.8**	**0.8**	**7.8**	**1.8**	**0.8**	**0.7**
Total Center Income & Indirect cost recovery	**1.6**	**0.1**	**0.2**	**1.2**			**0.1**
Total Allocations	**30.2**	**2.1**	**2.0**	**19.3**	**3.7**	**1.6**	**1.5**

Note: This table is required, for prior and plan years only (i.e. tables 8a and 8b), in the Financing Plan submission (September)

Table 8c. ILRI ALLOCATION OF MEMBER FINANCING TO PROJECTS BY OUTPUT- 2005

(in $ million)

			Outputs					
			Germplasm	Germplasm	Sustainable		Enhancing NARS	
Project	**Member**	**Total**	**Improvement**	**Collection**	**Production**	**Policy**	**Training**	**Other**
Project 1								
Targeting Opportunities	Belgium	**0.30**			0.25	0.03	0.01	0.01
	Canada	**0.50**			0.43	0.05	0.01	0.01
	FAO	**0.04**			0.03	0.00	0.00	0.01
	France	**0.04**			0.03	0.00	0.00	0.01
	Michagan State University	**0.06**			0.05	0.01	0.00	0.00
	Netherlands	**0.13**			0.11	0.01	0.01	0.00
	Others	**0.03**			0.03	0.00	0.00	0.00
	Rockefeller	**0.05**			0.04	0.01	0.00	0.00
	South Africa	**0.03**			0.03	0.00	0.00	0.00
	University of Florida	**0.03**			0.03	0.00	0.00	0.00
	Worldbank	**0.02**			0.02	0.00	0.00	0.00
	Unrestricted+center inc.	**1.37**			1.05	0.19	0.07	0.06
	Total Project	**2.60**			**2.10**	**0.30**	**0.10**	**0.10**
Project 2								
Enabling Innovation	Belgium	**0.06**			0.03	0.01	0.01	0.01
	Canada	**0.50**			0.25	0.09	0.08	0.08
	EU/ASARECA	**0.51**			0.26	0.09	0.08	0.08
	Germany	**0.30**			0.15	0.05	0.05	0.05
	IFAD	**0.49**			0.25	0.10	0.07	0.07
	Land O Lakes	**0.22**			0.12	0.04	0.03	0.03
	Philippines	**0.04**			0.02	0.00	0.01	0.01
	Rockefeller	**0.06**			0.03	0.01	0.01	0.01
	United Kingdom	**0.08**			0.04	0.02	0.01	0.01
	USA	**0.48**			0.24	0.10	0.07	0.07
	Worldbank	**0.02**			0.02	0.00	0.00	0.00
	Unrestricted+center inc.	**2.54**			1.29	0.49	0.38	0.38
	Total Project	**5.30**			**2.70**	**1.00**	**0.80**	**0.80**
Project 3								
Market Opportunities								
	Canada	**0.60**			0.30	0.24	0.03	0.03
	CFC	**1.00**			0.50	0.40	0.05	0.05
	France	**0.07**			0.04	0.03	0.00	0.00
	Germany	**0.08**			0.04	0.04	0.00	0.00
	Italy	**0.08**			0.04	0.04	0.00	0.00
	South Africa	**0.03**			0.02	0.01	0.00	0.00
	Worldbank	**0.02**			0.01	0.01	0.00	0.00
	Unrestricted+center inc.	**2.32**			1.15	0.93	0.12	0.12
	Total Project	**4.20**			**2.10**	**1.70**	**0.20**	**0.20**
Project 4								
Biotechnology	Austria	**0.20**	0.02	0.02	0.15	0.01	0.00	0.00
	Belgium	**0.13**	0.01	0.01	0.10	0.01	0.00	0.00
	Canada	**6.60**	0.66	0.66	4.95	0.13	0.10	0.10
	Comart Foundation	**0.07**	0.01	0.01	0.05	0.00	0.00	0.00
	EU	**0.94**	0.09	0.09	0.71	0.02	0.02	0.01
	France	**0.11**	0.01	0.01	0.08	0.00	0.00	0.01
	GEF	**0.19**	0.02	0.02	0.15	0.00	0.00	0.00
	Germany	**0.31**	0.04	0.03	0.23	0.01	0.00	0.00
	Ireland	**0.10**	0.01	0.01	0.08	0.00	0.00	0.00
	Japan	**0.16**	0.02	0.02	0.12	0.00	0.00	0.00
	Kenya	**0.03**	0.00	0.00	0.02	0.00	0.00	0.01
	Others	**0.04**	0.00	0.00	0.03	0.00	0.01	0.00
	Spain	**0.15**	0.02	0.02	0.11	0.00	0.00	0.00
	Sweden	**0.01**	0.00	0.00	0.01	0.00	0.00	0.00
	Wellcome	**0.20**	0.02	0.02	0.16	0.00	0.00	0.00
	Worldbank	**0.02**	0.00	0.00	0.02	0.00	0.00	0.00
	Unrestricted+center inc.	**4.74**	0.47	0.48	3.53	0.12	0.07	0.07
	Total Project	**14.00**	**1.40**	**1.40**	**10.50**	**0.30**	**0.20**	**0.20**
Project 5								
People, Livestock and the	Australia	**0.08**	0.02	0.02	0.04		0.00	0.00
environment	Canada	**0.50**	0.13	0.10	0.25		0.01	0.01
	Denmark	**0.14**	0.04	0.03	0.07		0.00	0.00
	EU	**0.73**	0.18	0.15	0.36		0.02	0.02
	Germany	**0.08**	0.02	0.02	0.04		0.00	0.00
	IDRC	**0.17**	0.04	0.03	0.09		0.01	0.00
	Italy	**0.08**	0.02	0.02	0.04		0.00	0.00
	Netherlands	**0.19**	0.05	0.04	0.10		0.00	0.00
	Others	**0.10**	0.03	0.02	0.05		0.00	0.00
	Switzerlands	**0.05**	0.01	0.01	0.03		0.00	0.00
	United Kingdom	**0.65**	0.16	0.13	0.32		0.02	0.02
	USA	**0.03**	0.00	0.01	0.02		0.00	0.00
	Worldbank	**0.51**	0.13	0.10	0.26		0.01	0.01
	Unrestricted+center inc.	**3.59**	0.87	0.72	1.83		0.08	0.09
	Total Project	**6.90**	**1.70**	**1.40**	**3.50**		**0.15**	**0.15**
Project 6								
Sytem-wide livestock programme								
	Canada	**0.30**	0.05		0.20	0.05	0.00	0.00
	Switzerland	**0.40**	0.15		0.20	0.05	0.00	0.00
	Total Project	**0.70**	**0.20**		**0.40**	**0.10**	**0.00**	**0.00**

Center Totals		Germplasm	Germplasm	Sustainable		Enhancing NARS	
	Total	**Improvement**	**Collection**	**Production**	**Policy**	**Training**	**Other**
Total Targeted Funding	**19.5**	**1.9**	**2.0**	**12.5**	**1.7**	**0.7**	**0.7**
Total Unrestricted Funding	**13.1**	**1.1**	**0.6**	**8.6**	**1.6**	**0.6**	**0.6**
Total Center Income & Indirect cost recovery	**1.1**	**0.2**	**0.3**	**0.2**	**0.1**	**0.2**	**0.1**
Total Allocations	**33.7**	**3.3**	**2.9**	**21.3**	**3.4**	**1.5**	**1.4**

Note: This table is required, for prior and plan years only (i.e. tables 8a and 8b), in the Financing Plan submission (September)

Table 9. ILRI RESEARCH AGENDA STAFF COMPOSITION, 2003-2007

	2003 (actual)		2004 (est)		2005 (proposal)		2006 (plan) 1/		2007 (plan) 1/	
	Hired by:		Hired by:		Hired by:		Hired by:		Hired by:	
	center	other	center	other	center	other	center	other	center	other
Internationally-Recruited Staff (IRS)										
Research and Research Support	71	2	61	2	66	2	68	2	70	2
of which:										
Associate Professionals	*8*		*8*		*10*		*12*		*13*	
Post-doctoral Fellows	*16*	*2*	*17*	*2*	*17*	*2*	*18*	*2*	*19*	*2*
Regular Appointments	*47*		*36*		*39*		*38*		*38*	
Training / Communications	4		1	2	2	2	2	2	2	2
of which:										
Associate Professionals	*3*									
Post-doctoral Fellows										
Regular Appointments	*1*		*1*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Research Management	11		4		4		4		4	
of which:										
Associate Professionals	*3*									
Post-doctoral Fellows										
Regular Appoitments	*8*		*4*		*4*		*4*		*4*	
Total IRS	**86**		**66**		**72**		**74**		**76**	
Support Staff	**708**		**708**		**712**		**716**		**720**	
TOTAL STAFF	**794**	**2**	**774**	**2**	**784**	**2**	**790**	**2**	**796**	**2**

1/ This column is not required for the Financing Plan submission (September)

DEFINITIONS

Internationally-Recruited Staff (IRS)

This category includes staff who carry out highly technical/senior functions, as defined by the center, and they may include personnel hired in the local or regional labor market. Included in this group, but shown separately, are post-doctoral fellows and associate professionals (who may have other titles in different centers), and who often are staff provided by donors as part of a project or other institutional arrangement. Costs for consultants engaged for specific tasks are not personnel expenses and the individuals are not staff; their costs should be calculated in the "supplies and services" category.

Support Staff

This category includes the numerical majority, in many cases, of personnel at a center. These are usually, but not necessarily always, individuals hired in the local labor market. They carry out functions which require less demanding skills than for the IRS category. The support staff category does not include seasonal field labor or other individuals engaged on a purely contract basis, for example when a center contracts with an employment agency to provide Improved policy analyses and techniques for policy formulation and public management are accessible to NARS,

Table 10. ILRI CASH REQUIREMENT, REVENUE FLOW, & CURRENCY SHARES, 2003-2005

(in $ Million)

MONTHLY CASH USES AND SOURCES

2003 Note: 1/	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Opening Cash Balance	**9.809**	**13.266**	**13.321**	**13.615**	**15.501**	**16.040**	**14.989**	**15.863**	**16.806**	**15.060**	**14.345**	**13.435**
Receipts												
Grants:												
Unrestricted	1.000	0.850	0.750	1.000	0.900	0.645	0.905	0.923	1.324	0.550	0.806	1.009
Restricted	3.600	1.445	1.400	2.600	2.005	1.500	1.208	1.700	0.759	0.776	0.654	4.313
Earned Incomes/others	0.026	0.005	0.055	0.208	0.115	0.195	0.517	0.046	0.167	0.124	0.045	0.173
Disbursements												
Operations	1.100	2.100	1.820	1.900	2.381	3.300	1.639	1.700	3.906	2.165	2.400	2.183
Capital acquisition	0.069	0.145	0.091	0.022	0.100	0.091	0.117	0.026	0.090	0.000	0.015	0.034
Others	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ending Cash Balance	**13.266**	**13.321**	**13.615**	**15.501**	**16.040**	**14.989**	**15.863**	**16.806**	**15.060**	**14.345**	**13.435**	**16.713**

2004 Note: 2/	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Opening Cash Balance	**16.713**	**16.811**	**17.386**	**18.748**	**18.289**	**16.750**	**16.974**	**16.005**	**16.298**	**15.652**	**16.645**	**17.778**
Receipts												
Grants:												
Unrestricted	1.222	1.050	0.990	0.920	0.850	0.645	0.964	1.223	1.324	1.150	0.706	0.981
Restricted	1.006	1.385	2.655	1.072	1.362	1.500	0.320	0.800	0.759	2.134	2.754	1.814
Earned Incomes/others	0.026	0.065	0.055	0.108	0.065	0.195	0.197	0.046	0.067	0.124	0.077	0.075
Disbursements												
Operations	2.076	1.880	2.320	2.517	3.781	2.040	2.400	1.700	2.706	2.365	2.400	3.562
Capital acquisition	0.080	0.045	0.018	0.042	0.035	0.076	0.050	0.076	0.090	0.050	0.004	0.034
Others	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ending Cash Balance	**16.811**	**17.386**	**18.748**	**18.289**	**16.750**	**16.974**	**16.005**	**16.298**	**15.652**	**16.645**	**17.778**	**17.052**

2005 Note: 3/	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Opening Cash Balance	**17.052**	**16.823**	**17.178**	**16.340**	**16.326**	**15.147**	**15.321**	**14.524**	**15.867**	**15.921**	**15.406**	**15.237**
Receipts												
Grants:												
Unrestricted	1.222	1.150	0.890	1.328	0.893	0.755	1.464	1.723	1.324	0.550	0.406	0.280
Restricted	1.006	1.385	1.355	1.072	1.362	1.490	1.093	0.800	1.159	1.576	2.206	1.575
Earned Incomes/others	0.026	0.065	0.055	0.108	0.065	0.095	0.005	0.046	0.067	0.024	0.069	0.375
Disbursements												
Operations	2.383	2.080	3.020	2.480	3.381	2.090	3.278	1.200	2.386	2.365	2.746	2.996
Capital acquisition	0.100	0.165	0.118	0.042	0.118	0.076	0.081	0.026	0.110	0.300	0.104	0.060
Others	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ending Cash Balance	**16.823**	**17.178**	**16.340**	**16.326**	**15.147**	**15.321**	**14.524**	**15.867**	**15.921**	**15.406**	**15.237**	**14.411**

CURRENCY STRUCTURE OF EXPENDITURES

		2003 (actual) note 1/			2004 (estimate) note 2/			2005 (proposal) note 3/		
Currency		Amount	$ value	% share	Amount	$ value	% share	Amount	$ value	% share
US Dollar			18.6	62%		19.4	62%		21.1	63%
Ksh		340	6.2	21%		6.3	20%		6.6	20%
Birr		30	3.5	12%		3.6	11%		3.8	11%
UK Sterling		1	1.4	5%		1.5	4%		1.6	5%
Others	note 4/		0.5	2%		0.6	2%		0.6	2%
TOTAL			30.2	100%		31.4	100%		33.7	100%

Notes:
1/ this part to be completed only in the Research Agenda submission (March).
2/ this part to be completed in both the Agenda & Financing Plan submissions.
3/ this part to be completed only in the Financing Plan submission (September).
4/ All other currencies the sum of which accounts for less than 5% of total expenditure.

Table 11. ILRI STATEMENT OF FINANCIAL POSITION, 2003-2007

(in $'000)

Assets	2003 (actual)	2004 (est)	2005 (proposal)	2006 (plan) 1/	2007 (plan) 1/
Current Assets					
Cash & Cash Equivalents	16,713	17,052	14,411	15,020	15,721
Accounts Receivable					
Donors	7,683	4,212	4,712	4,274	4,038
Employees	292	315	128	128	128
Other	935	750	850	950	1,050
Inventories	821	805	1,430	1,600	1,900
Prepaid Expenses	231	345	365	445	445
Total Current Assets	**26,675**	**23,479**	**21,896**	**22,417**	**23,282**
Fixed Assets					
Property, Plant, & Equipment	54,555	55,197	56,497	58,097	59,897
Less: Accumulated Depreciation	-39,060	-41,460	-44,060	-46,760	-49,560
Total Fixed Assets - Net	**15,495**	**13,737**	**12,437**	**11,337**	**10,337**
Total Assets	**42,170**	**37,216**	**34,333**	**33,754**	**33,619**
Liabilities and Net Assets					
Current Liabilities					
Bank Indebtedness					
Accounts Payable					
Donors	10,257	5,840	2,671	1,957	1,607
Employees	1,018	845	900	900	900
Others	1,499	1,110	1,170	1,170	1,185
Accruals and Provisions	1,682	1,725	1,846	1,931	2,081
Total Current Liabilities	**14,456**	**9,520**	**6,587**	**5,958**	**5,773**
Non current lialities	**618**	**600**	**650**	**700**	**750**
Total Liabilities	**15,074**	**10,120**	**7,237**	**6,658**	**6,523**
Net Assets					
Unrestricted					
Designated	16,079	14,321	13,021	11,921	11,021
Undesignated	11,017	12,775	14,075	15,175	16,075
Total Net Assets	**27,096**	**27,096**	**27,096**	**27,096**	**27,096**
Total Liabilities & Net Assets	**42,170**	**37,216**	**34,333**	**33,754**	**33,619**

1/ This column is not required for the Financing Plan submission (September)